



AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

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FACILITY FORM 602

N67 11391

(ACCESSION NUMBER)

232
(PAGES)

(NASA CR OR TMX OR AD NUMBER)

(THRU)

1
(CODE)

04
(CATEGORY)

ff 653 July 65

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during September, 1966



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. OCTOBER 1966

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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- b. AIAA entries identified by their *IAA* accession numbers (A66-10000 series); and
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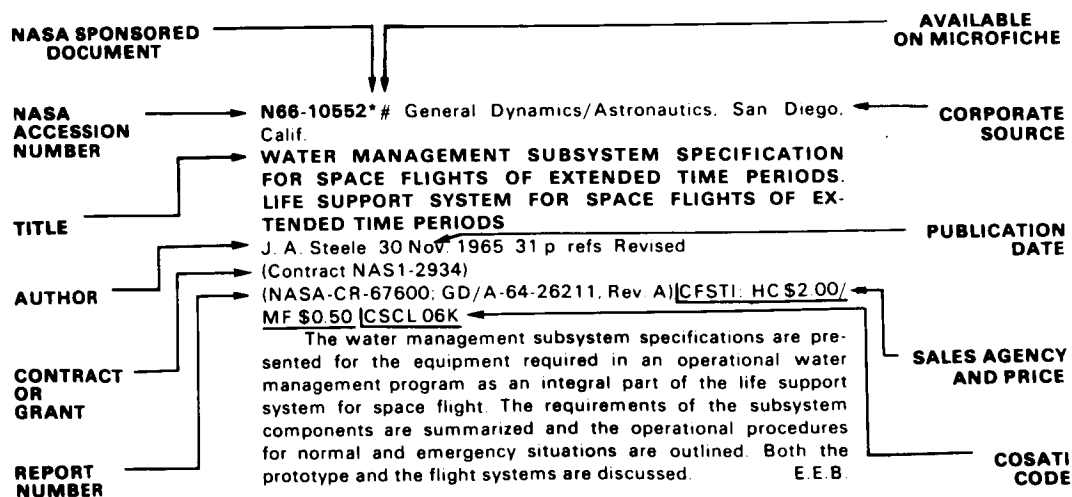
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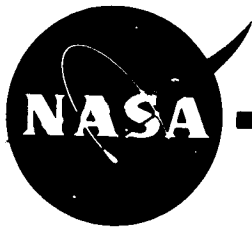
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TYPICAL CITATION AND ABSTRACT





AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography OCTOBER 1966

STAR ENTRIES

N66-30012# RAND Corp., Santa Monica, Calif.
TEMPORAL FACTORS IN SUBJECTIVE COLOR

Joseph J. Sheppard, Jr. Mar. 1966 43 p refs

(Contract ARPA SD-79; ARPA Order 189-61)

(RM-4770-ARPA; AD-631874) CFSTI: HC \$2.00/MF \$0.50

The memorandum provides a synopsis of what is known about subjective-color sensations produced by temporal factors in the retinal luminous stimulus. Four principal psychophysical phenomena or effects involved in subjective color are identified and discussed. The Prevost-Fechner-Benham effect refers essentially to the evocation of a color sensation that differs when the visual stimuli are presented intermittently rather than continuously. The Broca-Sulzer-Pieron effect concerns the variations of color sensations with time. The Brucke-Bartley effect refers to the enhanced brightness of visual stimuli when presented intermittently rather than continuously. The disappearance of visual sensation when the retinal image is artificially stabilized so that it falls continuously on the same receptors is termed the Ditchburn-Ratliff effect. The use of the Prevost-Fechner-Benham effect to obtain colored images on black-and-white television receivers is discussed to illustrate one technological application of subjective color. An unexpected appearance of the Prevost-Fechner-Benham effect in a visual experiment is discussed to emphasize the dangers involved in a failure to consider subjective-color effects during the design of man-machine systems utilizing human visual characteristics.

Author (TAB)

N66-30022# Lund Univ. (Sweden). Dept. of Zoology.
LOCALIZATION OF MONOAMINERGIC MECHANISMS Final Report

Erik Dahl and Bengt Falck 25 Jan. 1966 32 p refs

(Grant AF-EOAR-64-5)

(AFOSR-66-0711; AD-632127) CFSTI: HC \$3.60/MF \$0.50

Using the sensitive and specific fluorescence method of Falck and Hillarp in combination with electron microscopy and biochemical methods for the localization and estimation of the monoamines, their immediate precursors, and the pertinent enzymes, monoaminergic nervous mechanisms are studied in a broad comparative material. The fluorescence method has been thoroughly studied both from the

chemical and histochemical point of view and is now well standardized. Monoaminergic mechanisms constitute a considerable part of the mollusk nervous system. These mechanisms were studied in both gastropod and bivalve species. Studies of similar type were carried out on annelids and crustaceans and these have disclosed further monoaminergic mechanisms. Some of the monoaminergic system in the upper brain stem in the pigeon have been mapped out. A comprehensive study is performed on the sympathetic innervation of the eye and its adnexa. The dilator muscle of the rat iris was found to contain a hitherto unknown cholinergic ground-plexus. Although the cholinergic receptor is not identified there are reasons for believing that an interaction exists between these two terminal plexus. The monoaminergic mechanisms in the pineal gland are studied in several mammalian species. Monoaminergic mechanisms in the hypothalamo-hypophyseal complex are under investigation. In the cod, the existence of short noradrenergic neurons having their cell bodies located peripherally near the effector cells was demonstrated.

Author (TAB)

N66-30026# RAND Corp., Santa Monica, Calif.

A CRITICAL REVIEW OF THE EXPERIMENTAL FOUNDATION OF HUMAN COLOR PERCEPTION

Joseph J. Sheppard, Jr. Jan. 1966 199 p refs

(Contract ARPA SD-79; ARPA Order 189-61)

(RM-4196-ARPA; AD-630316) CFSTI: HC \$5.00/MF \$1.00

A presentation of the minimum material needed for a comprehensive study of normal human color perception. The artificial nature of colorimetry is discussed, with emphasis on the distinction between experimental facts established in the matching experiments and the formalism of colorimetry derived in part from these facts. A representative portion of the available experimental data on individual foveal spectral sensitivity is collected and analyzed. Data on the initial photoreception process and the anatomy, histology, morphology, ontogeny, and electrophysiology of the retinal neurons are analyzed, noting the multiplicity of results indicating a fundamental difference between receptor mechanisms in the rods and cones. A review of data on central neural mechanisms indicates a complex, dynamic role for the lateral geniculate nuclei in human color vision. Considerations of diverse psychophysiological phenomena are summarized. The general conclusion of the study is that the available experimental evidence does not clearly dictate the fundamental physiological processes mediating human color vision. Principal conclusions are discussed in relation to the three distinct fields of colorimetry, visual biophysics, and visual psychophysics. Four suggestions are given for psychophysical modeling.

Author (TAB)

N66-30084* # National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography with Indexes

Jun. 1966 193 p refs

(NASA-SP-7011(25)) CFSTI HC \$1.00/MF \$1.25 CSCL 06S

Abstracts and indexes are compiled for researches dealing with biological, environmental, physiological, and psychological effects to which man is subjected during simulated and actual space flights. References describing similar effects on lower forms of life are included; and attention is given to such related topics as life support systems, safety and survival, and sanitation. While the emphasis is placed on applied research, there are numerous references to theoretical experiments. This is part of a continuing bibliography which includes abstracts of articles previously announced by the American Institute of Aeronautics and Astronautics, the Library of Congress and NASA. M W R

N66-30115* # Douglas Aircraft Co., Inc., Santa Monica, Calif. Advance Biotechnology Dept

A COMPARATIVE STUDY OF THE PHYSIOLOGICAL EFFECTS OF IMMERSION AND BED REST

P. D. White, J. W. Nyberg, L. M. Finney, and W. J. White Jun. 1966 83 p refs

(Contract NAS9-4166)

(NASA-CR-65414; DAC-59226) CFSTI HC \$3.00/MF \$0.75 CSCL 06S

Physiological responses of 10 subjects, each serving as his own control, were compared during alternate 10-day periods of silicone immersion and bed rest. The major findings of this study were: (1) the detrimental effects of prolonged immersion and bed rest on orthostatic tolerance and extracellular fluid were reconfirmed; (2) the incidence of presyncopal reactions on the tilt table was higher and occurred earlier during immersion than during bed rest; (3) during immersion the daily solute load excreted by the kidney, osmolar clearance, and urine output were higher than during bed rest; (4) a negative free-water clearance was seen in all subjects during immersion and bed rest; (5) except for two subjects, the skin problems encountered during immersion were trivial; and (6) the silicone fluid, immersion tanks, filtration, and cooling equipment met the requirements of the experiment. Author

N66-30166# Chicago Univ., Ill.

USAF RADIATION LABORATORY Quarterly Progress Report

15 Jul. 1965 50 p refs

(Contract AF 41(609)-1693)

(QPR-56; AD-619500)

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2. STUDIES ON THE EFFECTS OF VARIOUS DRUGS ON THE ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE HEMATOPOIETIC TISSUES OF RATS EXPOSED TO COBALT-60 GAMMA RADIATION R. G. Tardiff and K. P. Du Bois p 14-25 refs (See N66-30168 17-04)

3. THE INHIBITORY EFFECT OF X-RADIATION ON THE DEVELOPMENT OF N-DEMETHYLASE ACTIVITY IN THE LIVERS OF YOUNG, MALE RATS K. P. Du Bois and F. Kinoshita p 26-35 refs (See N66-30169 17-04)

4. FURTHER STUDIES ON THE MECHANISM OF ACTION OF 2-MERCAPTOETHYLAMINE K.-m. Yam and K. P. Du Bois p 36-47 refs (See N66-30170 17-04)

N66-30167# Chicago Univ., Ill.

PRELIMINARY STUDIES ON THE MECHANISM OF THE RADIOPROTECTIVE EFFECTS OF DIMETHYLSULFOXIDE (DMSO) IN X-IRRADIATED MICE

V. Plzak and J. Doull *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jul. 1965 p 1-13 refs (See N66-30166 17-04)

Preliminary studies were conducted to determine the radioprotective effect of administering dimethylsulfoxide (DMSO) synergistically with other protective agents. Experimental results on mice indicate: (1) The radioprotective effect of DMSO persists at least two hours after administration. (2) The hyperbaric oxygen exposure did not reduce the radioprotective effect of DMSO. (3) In combination with other drugs, an increased number of 30-day survivors was obtained, the enhanced protective effect was qualitatively similar at each of the three X-ray dosage levels used and with each of the three radioprotective agents (p-amino-propionophenone (PAPP), mercaptoethylamine hydrochloride, and 2-aminoethylisothiourea dichloride). In addition, DMSO in combination with PAPP permitted 60 percent of a group of mice given 1200 R of whole-body X-irradiation to survive the 30-day post-irradiation period. R L I

N66-30168# Chicago Univ., Ill.

STUDIES ON THE EFFECTS OF VARIOUS DRUGS ON THE ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE HEMATOPOIETIC TISSUES OF RATS EXPOSED TO COBALT-60 GAMMA RADIATION

Robert G. Tardiff and Kenneth P. Du Bois *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jul. 1965 p 14-25 refs (See N66-30166 17-04)

Measurements of the adenosine triphosphatase activity of the hematopoietic tissues of adult female rats exposed to repeated daily doses of cobalt-60 gamma radiation at doses ranging from 45 R to 54 R per day, and the influence of various drugs on the radiation-induced increase in adenosine phosphatase activity were investigated. It was found that a progressive increase in the enzyme activity occurred during the first four days of irradiation after which time continued exposure resulted in a relatively constant, elevated level of activity. A protective effect against this increased enzyme activity was obtained by treating the rats with hydrocortisone, cortisone acetate, progesterone, estradiol, thyroid stimulating hormone, thyroxine, adrenal cortex injection, and adrenocorticotrophic hormone. Mercaptoethylamine, aminoethylisothionium bromide, hydroxylamine, and cysteine also provided protection against spleen injury following irradiation. Similarly, yeast extract, liver extract, liver fractions, and a liver concentrate all exhibited strong radioprotective properties against enzyme changes in the spleen. R L I

N66-30169# Chicago Univ., Ill.

THE INHIBITORY EFFECT OF X-RADIATION ON THE DEVELOPMENT OF N-DEMETHYLASE ACTIVITY IN THE LIVERS OF YOUNG, MALE RATS

Kenneth P. Du Bois and Florence Kinoshita *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jul. 1965 p 26-35 refs (See N66-30166 17-04)

Studies were conducted on the inhibitory effect of X-radiation on the biosynthesis of enzymes located in the microsome fraction of the liver which catalyze the metabolism of steroids and foreign chemicals. A previous measurement procedure was modified to determine the oxidation removal of methyl groups from nitrogen atoms (N-demethylation). This method constituted a valid, quantitative enzyme assay and was somewhat simplified to facilitate analysis. After development of the assay procedure, it was applied to the

livers of normal and irradiated rats. It was found that the N-demethylase activity of the livers of normal adult male rats was 4 to 5 times the level in the livers of adult females and weanling males. Weanling male rats (22 days old) were exposed to 400 R and the rate of enzyme development was followed. Comparison of the rate of N-demethylation in the livers of normal and irradiated rats indicated that radiation retarded development of the enzyme system; however, eventually reversal of the effect of radiation was noted. L.E.W.

N66-30170# Chicago Univ. III

FURTHER STUDIES ON THE MECHANISM OF ACTION OF 2-MERCAPTOETHYLAMINE

Ker-Ming Yam and Kenneth P. Du Bois. *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jul. 1965 p 36-47 refs (See N66-30166 17-04)

Development of a reaction system using rat liver homogenates for studying the metabolism of hexobarbital is discussed, and application of the method for measuring the effect of 2-mercaptoethylamine (MEA) on hexobarbital metabolism is described. The optimal amount of heptane needed for the extraction of hexobarbital from the system was determined by experiments with different amounts of solvent to compare the percent recovery of hexobarbital. To test the optimal concentration of enzyme for the reaction system, the amount of hexobarbital metabolized in a 30-minute period was measured for different levels of whole liver homogenate. Optimal conditions of the co-factors are considered, and the influence of incubation time on metabolism of hexobarbital by the male rat liver is illustrated. A sex difference was observed in the metabolism of hexobarbital in the rat with the adult female exhibiting much lower enzyme activity. Test results showed that at concentrations comparable to the radioprotective dose, MEA produced about 23% inhibition of hexobarbital metabolism. S.P.

N66-30192# Royal Aircraft Establishment, Farnborough (England).

MECHANICAL AND ELECTRODYNAMIC SIMILITUDE IN BIOLOGY

E. Guerra and B. Gunther. Mar. 1966 12 p refs. Transl. into ENGLISH from Bol. Soc. Biol. (Concepcion) v. 29, 1956 p 87-91

(RAE-LIB-TRANS-1155) CFSTI: HC \$1.00/MF \$0.50

The theoretical basis of biological similitude is analyzed in relation to the rules of mechanical and electrodynamic similarities. A reduction formula is obtained for biological similarities, whose exponent lies between the values of those of the physical reduction formulas. Utilizing the equation of biological similarity it has been possible to predict the variations of several physiological functions in relation to body weight. Author

N66-30197# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

PROBLEMS IN AERIAL APPLICATION: A COMPARISON OF THE EFFECTS OF DIELDRIN POISONING IN COLD-ADAPTED AND ROOM-TEMPERATURE MAMMALS

George Clark. Apr. 1966 10 p refs (AM-66-5)

The effects of dieldrin poisoning on the liver were compared in cold-adapted rats and normal rats. One-fourth of the cold-adapted rats succumbed to the poisoning while all of the normal rats survived. There were minimal fat deposits in both groups, but the cold-adapted rats were least affected. By contrast, cytoplasmic RNA was altered to a greater extent in the cold-adapted rats, although with both the changes

were located periportal. Another stain that is probably specific for secondary amines was increased in both treated groups but was decreased in cold adaptation. Author

N66-30198# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT DURING THE PERIODS OF TRANSITION. II: WEST-EAST FLIGHT

G. T. Hauty and T. Adams. Dec. 1965 18 p refs (AM-65-29)

At periodic intervals throughout the biological day, biomedical assessments were made for a week prior to jet flight to Rome, for 12 days at Rome, and for a week following return to Oklahoma City. A primary shift of circadian periodicity was manifested by physiological functions—rectal temperature, heart rate, etc. Increase in fatigue occurred during the primary period of transition and following return, but psychological performance was not impaired during either period. Duration of the fatigue was shorter than the time lag of the physiological phase shifts. Author

N66-30209# Battelle-Northwest, Richland, Wash. Biology Dept.

GAMMA RADIATION DOSIMETRY OF ^{137}Cs IN SHEEP EVALUATED WITH THERMOLUMINESCENT DOSIMETERS

C. R. Watson and R. O. McClellan. 2 Nov. 1965 16 p refs (Contracts AT(45-1)-1830; AT(45-1)-1350)

(BNWL-SA-172) CFSTI: HC \$1.00/MF \$0.50

Lithium fluoride thermoluminescence dosimetry (TLD) was used to measure gamma doses *in vivo* in male sheep ingesting ^{137}Cs . Two commercial TLD systems were found satisfactory for measurements of 500 to 800 mR after a nitrogen purge of the readout chamber was added. Specially fabricated teflon capsules (4mm wall thickness) shielded the LiF from the beta radiation of ^{137}Cs without appreciably attenuating the gamma radiation. Dosimeters were surgically implanted and exposed *in vivo* for 15 days to measure gamma radiation dose rates of 20-60 mrad/day (total dose less than 1 rad) in sheep with body burdens of approximately 300 μC ^{137}Cs . Dosimeters were implanted in another group of sheep prior to feeding of 50 μC ^{137}Cs per day. These animals were killed at intervals to study the accumulation of gamma dose at various organs during a month of ^{137}Cs feeding. Tissue acceptance of the dosimeters was excellent, and dose distribution patterns were similar to those reported earlier. These measurements support NCRP recommendations which assume that designation of the whole body as critical organ will adequately consider the dose to the gonads in the case of a relatively uniformly distributed gamma emitting radionuclide. Author (NSA)

N66-30211# Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).

EFFECT OF LOCAL IRRADIATION ON THE PROTEOLYTIC ACTIVITY OF LEUCOCYTES IN CANCER PATIENTS

M. Kopitar, J. Skrk, L. Savnik, D. Lebez, T. Poniz et al. Nov. 1965 12 p refs. Submitted for Publication (NIJS-R-467)

Effects of small, local radiation doses on cathepsin activity were studied in leukocytes of cancer patients. The catheptic activity of leukocytes before and after radiotherapy is described. A therapeutic dose of 100 R or 2×150 R gave rise to a considerable increase in the catheptic activity of leukocytes. The differential blood picture and the leukocyte count, as compared with the blood picture of healthy controls, did not change significantly. NSA

N66-30249# Karolinska Institutet, Stockholm (Sweden).
Dept. of Physiology

[DISTRIBUTION OF BIOLOGICALLY ACTIVE COMPOUNDS IN THE BODY] Final Report

U. S. von Euler 31 Mar. 1966 9 p refs

(Grant AF-EDAR-65-52)

(AFOSR-66-0718; AD-632113) CFSTI: HC \$1.10/MF \$0.50

Abstracts of the following papers are presented: catecholamine depletion and uptake in adrenergic nerve vesicles and in rabbit organs after decaborane; uptake of catecholamines in the rabbit heart after depletion with decaborane; stereospecific catecholamine uptake in rabbit hearts depleted by decaborane; refilling of noradrenaline stores in the prenlyamine depleted rabbit heart after injection of octopamine and tyramine; catecholamines in nerve and organ granules; adrenomedullary response to 2-deoxyglucose in the hypothalamic, euthyroid, and hyperthyroid rat; effect of respiratory acidosis on vasoconstrictor effects of directly and indirectly acting sympathomimetic amines in cats; the adrenergic innervation of the vas deferens and the accessory male genital gland; distribution and function of adrenergic nerves in the rabbit fallopian tube; effects of acute heart failure and administration of ouabain on cardiac catecholamine uptake; acceleration of noradrenaline turnover in the mouse heart by cold exposure; and release of cardiac noradrenaline by decaborane in the heart-lung preparation of guinea pig. Author (TAB)

N66-30253# Naval Research Lab., Washington, D. C.
SURFACE CHEMISTRY OF PROTEINS AND POLYPEPTIDES

George I. Loeb 30 Nov. 1965 81 p refs

(NRL-6318; AD-632104) CFSTI: HC \$3.00/MF \$0.75

The report is a review of recent literature in the field of polypeptide and protein surface chemistry, concentrating on the last decade. Theoretical approaches to polymers at liquid interfaces are considered, and surface measurement techniques are briefly outlined. The various classes of polypeptides are considered, followed by a discussion of proteins in general and specific proteins in particular. Enzymatic activity, structure, and adsorption at various surfaces are considered also. Author (TAB)

N66-30269# Ohio State Univ., Columbus. Human Performance Center.

INFLUENCE OF STRESS VARIABLES ON DISPLAY DESIGN Final Report, Feb. 1965-Jan. 1966

William C. Howell, William A. Johnston, and Irwin L. Goldstein Griffiss AFB, N. Y., RADC, Apr. 1966 47 p refs

(Contract AF 30(602)-3622)

(RADC-TR-66-42; AD-481509)

Nine exploratory studies and five formal experiments were conducted to determine: (1) whether stress decrements occur in a complex display monitoring situation; (2) if so, what variables contribute most to these decrements; and (3) what conditions—particularly display conditions—may be introduced to reduce such decrements. Variables studied include stimulus density; signal frequency, kind, and predictability; irrelevant signal characteristics; display format; duration of monitoring; and response requirements. The major findings suggested that serious stress decrements do occur, but these are not simple monotonic functions over time. Decrements are most severe under conditions of high display density and low signal frequency particularly when predictability of signal occurrence is low and irrelevant information is present. Performance does not seem to deteriorate over weeks or months of daily monitoring sessions.

Display formats in which classes of information are separated spatially or in which some spatial compression is introduced seem to reduce decrements and enhance overall performance. Implications of these and other more tentative findings are discussed relative to the problem of display design and future research. Author (TAB)

N66-30283# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

PULMONARY FUNCTION IN MAN DURING PROLONGED ACCELERATION. I: DIFFUSING CAPACITY AND BLOOD FLOW

Gordon G. Power, Jr., Richard W. Hyde, Raymond J. Sever, Frederic G. Hoppin, Jr., and Jean R. Nairn (Pa. Univ.) 30 Jun. 1965 22 p refs

(Grant NIH G-H-5430)

(NADC-ML-6512; AD-467142)

This report discusses the possible causes of the decreased arterial oxygen saturation seen when a subject is accelerated in a centrifuge by measuring simultaneously the pulmonary diffusing capacity, and the pulmonary capillary blood flow, using breathholding techniques with carbon monoxide and acetylene. After one minute of forward acceleration at eight times normal gravity, 8G, average capillary diffusing capacity decreased 35% from an initial control of 33.7 to 21.5 ml/min X mm Hg in four subjects. Although this decrease was statistically significant ($p < 0.01$) the values observed were not low enough to indicate that impaired diffusion was a prime cause of arterial unsaturation. Average Qc decreased 35% during acceleration from an initial control value of 12.9 to 8.2 l/min, also a significant change ($p < 0.01$). These values may have indicated that total pulmonary blood flow was reduced, but a more likely explanation is that a large portion of pulmonary flow perfused non-ventilated regions. Capillary diffusion capacity and Qc returned toward initial control levels within 8 minutes after acceleration in most instances. Author (TAB)

N66-30299*# California Univ., Berkeley. Space Sciences Lab.

OCCURRENCE OF ISOPRENOID ALKANES IN A PRECAMBRIAN SEDIMENT

G. Eglinton, P. M. Scott, T. Belsky, A. L. Burlingame, W. Richter et al 16 Mar. 1965 67 p refs *Its Ser. No. 6, Issue No. 9*

(Grant NsG-101-61)

(NASA-CR-62300) CFSTI: HC \$3.00/MF \$0.75 CSCI 06A

Alkane fractions derived from a Precambrian sediment and associated oil seepage were studied to supplement information on the origin of terrestrial life. The materials processed were derived from reference samples of tobacco leaf wax, and a Colorado oil shale. Rock samples were crushed into small chips, thoroughly washed with organic solvent, and pulverized into a fine powder. Hot extraction, or ultrasonic extraction with organic solvent, was then performed. Column chromatography over activated alumina, molecular sieve (5 Å) treatment, and gas-liquid chromatography provided the isolation procedures for the individual hydrocarbons, which were identified by retention time on gas-liquid chromatography and by comparison of infrared and mass spectra. It was concluded that isoprenoid hydrocarbons, including farnesane, pristane, and phytane are present in the marker bed of the Precambrian nonesuch shale formation at the White Pine Mine, Michigan, and in the oil seep associated with it. L. E. W.

N66-30308# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF ULTRASOUND AND HIGH-FREQUENCY NOISE ON THE BLOOD SUGAR LEVEL

Z. Z. Ashbel' 29 Jun. 1966 11 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 2, 1965 p 29-32

(JPRS-36252; TT-66-32685) CFSTI: \$1.00

Effects of ultrasonic oscillations and noise transmissions through the air upon blood sugar level were investigated in 40 workers who had been employed at ultrasonic installations for periods of between one and two years. Contact irradiation was considered to have no decisive significance since it was of short duration. Average blood sugar level in persons with empty stomachs subjected to the effects of ultrasonic energy and high frequency noise was found to be 66 mg % after three hours work, whereas level had been 82 mg % before work. On the basis of this study and a perusal of the literature, it is concluded that hypoglycemia observed in workers is caused by the ultrasonic and noise effects produced by the equipment used at work. M.W.R.

N66-30321# School of Aerospace Medicine, Brooks AFB, Tex.

PAROTID FLUID STEROID AND ELECTROLYTE RESPONSES TO EXERCISE Final Report, Apr. 1965

Ira L. Shannon Mar. 1966 12 p refs

(SAM-TR-66-31, AD-632501) CFSTI: HC \$1.00/MF \$0.50

On 5 successive days, 6 subjects underwent a 10-mile, 2-hour hike to investigate the effects of exercise on parotid fluid flow rate, and levels of free 17-hydroxycorticosteroids, sodium, potassium, and chloride in this secretion. Means for the 5 days for all 6 subjects showed no significant differences in these variables that could be related to exercise. There was, thus, no suggestion of altered adrenocortical function or change in electrolytes that might be expected to accompany such an alteration. Author (TAB)

N66-30341*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.

BIOLUMINESCENCE: A SELECTED BIBLIOGRAPHY FROM THE LITERATURE RETRIEVAL SYSTEM, SPACE BIOLOGY BRANCH

Apr. 1966 21 p refs

(NASA-TM-X-55518; X-624-66-152) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

This report contains a bibliography on bioluminescence, and includes biochemistry, light measurement, natural growth, and culturing methods for bacteria, fireflies, and other organisms. N.E.N.

N66-30386*# St. Louis Univ., Mo.

THE ROLE OF THE SOCIAL PHILOSOPHER IN THE SPACE AGE

Robert J. Henle /in NASA, Washington Proc. of the 5th Natl. Conf. on the Peaceful Uses of Space 1966 p 155-157 (See N66-30366 17-30) GPO: HC \$1.50; CFSTI: MF \$1.25

New communications capabilities—encompassing telephones, computer storage of knowledge, printouts, television across the world, etc.—will make human participation in actual events as they occur possible, and at the same time give future generations a relationship with the past that will almost approach a living participation. Human values should be used to manage and manipulate these new technologies to insure the future welfare and happiness of all mankind. G.G.

N66-30390*# Massachusetts Inst. of Tech., Cambridge. Dept. of Astronautics and Aeronautics.

CREATIVITY, EDUCATION, AND SPACE EXPLORATION

C. S. Draper /in NASA, Washington Proc. of the 5th Natl. Conf. on the Peaceful Uses of Space 1966 p 190-193 (See N66-30366 17-30) GPO: HC \$1.50; CFSTI: MF \$1.25

The new technology of space travel together with new knowledge becoming available from observations made from space stations, greatly affects advanced education. New areas of learning are thus developed and students are motivated to follow academic careers through to completion. The challenges of space exploration and the opportunities associated with its accomplishments develop creativity in talented individuals and lead to innovations and benefits for the human society. G.G.

N66-30391*# Yale Univ., New Haven, Conn.

THE SOCIAL CONSEQUENCES OF THE SPACE AGE

Harold D. Lasswell /in NASA, Washington Proc. of the 5th Natl. Conf. on the Peaceful Uses of Space 1966 p 194-199 refs (See N66-30366 17-30) GPO: HC \$1.50; CFSTI: MF \$1.25

The potential significance of the Space Age on the legal, governmental, and political order of all mankind is explored. Social consequences and potentialities of the coming conquest of space will require cultural as well as biological adaptation. Future research policies will propose prototypes and pilot projects to initiate and study space communities of distinct social compositions and of contrasting political, economic, familial, and other institutions. Continuing surveys of the social consequences of space throughout the world community should be designed to describe changes in both perspective and overt behavior. G.G.

N66-30395*# National Aeronautics and Space Administration, Washington, D. C.

PROCEEDINGS OF A CONFERENCE ON THEORETICAL BIOLOGY

George J. Jacobs, ed. 1966 211 p refs Conf. held at Princeton, N. J., 22-24 Nov. 1963

(NASA-SP-104) GPO: HC \$1.00; CFSTI: MF \$1.25 CSCL 06C

CONTENTS:

1. ON *DE NOVO* CELL SYNTHESIS p 13-138 (See N66-30396 17-04)
2. ASPECTS OF THEORETICAL ECOLOGY R. Levins p 139-174 (See N66-30397 17-04)
3. SYNOPSIS E. C. Pollard p 175-188 ref

N66-30396*# National Aeronautics and Space Administration, Washington, D. C.

ON *DE NOVO* CELL SYNTHESIS

Initis Proc. of a Conf. on Theoret. Biol., 1966 p 13-138 (See N66-30395 17-04) GPO: HC \$1.00; CFSTI: MF \$1.25

The contribution of theory to areas of biological knowledge is discussed, with emphasis focused on conceptual ideas for synthesizing a cell *de novo*. In the round-table discussion, attention centered on the macromolecular aspects: the isolation of the polymerase for DNA and for RNA, and the polymerase for making the peptide bond; and functional structures. A theoretical viewpoint is presented on what should constitute the smallest living cell, or the minimal cell, and some evidence is offered as to what comes closest, experimentally, to this minimum. The specificity and synthesis of organelles is considered, and data obtained from studying yeast mitochondria are discussed. Results are also given on model natural experiments with a precellular model. It was generally concluded that theoretical biology should be concerned first with identifying the functional prerequisites of the minimum living organism, and then determining whether the known cells fulfill these basic functions so that they are not only physically sufficient but physically necessary. M.G.J.

N66-30397* # National Aeronautics and Space Administration, Washington, D. C.

ASPECTS OF THEORETICAL ECOLOGY

R. Levine. In its Proc. of a Conf. on Theoret. Biol., 1966 p 139-174 (See N66-30395 17-04) GPO: HC \$1.00; CFSTI: MF \$1.25

Several hypotheses relating to theoretical ecology were presented for roundtable discussion, with population biology defined as an area where three separate disciplines are coming together: evolution, population genetics, and population ecology. The question of species interaction is considered, in which it is assumed that competition between species exists at all times. In another approach, the thermodynamic properties of the community are considered, and energy relations studied. This viewpoint holds that many of the dynamics of the population can be determined, not in terms of the biological coefficients that have been identified but in terms of the same physical concepts that can be used in nonliving systems. The analytical difficulties encountered in evolving mathematical models are assessed, and the need for systematically devising a particular class of non-Markov processes for certain problem solutions is pointed out. M.G.J.

N66-30444* # Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

EFFECTS OF DECOMPRESSION ON OPERATOR PERFORMANCE

William F. O'Connor and George E. Pendergrass. Apr. 1966 18 p refs (AM-66-10)

This study was performed to provide more quantitative estimates of degradation of pilot performance following decompression and the extent to which a decompression with mask donning interrupts the task of piloting. The experiments utilized a Scow complex coordinator and were conducted in an altitude chamber. Subjects were decompressed to altitudes from 25,000 to 41,000 feet. Results indicate impairment of performance for 2 to 4 minutes following rapid decompression. Total time loss from mask donning is much more extended than the 5 to 6 seconds required to don the mask.

Author

N66-30474* # Brookhaven National Lab., Upton, N. Y.

HYPERTENSION

Lewis K. Dahl [1963] 16 p refs

(Contract AT(30-2)-GEN-16)

(BNL-8671) CFSTI: HC \$1.00/MF \$0.50

Evidence is briefly reviewed relating some nutritional elements and hypertension. In rats, hypertension can be produced by chronic excess salt (sodium chloride) consumption; the hypertension so produced can be ameliorated by increasing the dietary potassium or enhanced by other, unidentified, ions. Cadmium, without salt, appears capable of producing hypertension in female rats. In man, the evidence linking salt consumption to hypertension is circumstantial, the most suggestive of which is perhaps the fact that in certain communities with different levels of average salt consumption, the prevalence of hypertension increased, *per passu*, with the average intake of salt. There is some circumstantial evidence to support the thesis that trace elements may be involved in human hypertension. Author (NSA)

N66-30480* # Oak Ridge National Lab., Tenn.

OBSERVATIONS OF VIRAL, CHEMICAL, AND RADIATION-INDUCED MYELOID AND LYMPHOID LEUKEMIAS IN RF MICE

A. C. Upton, V. K. Jenkins, H. E. Walburg, Jr., R. L. Tyndall, and J. W. Conklin [1965] 47 p refs. Presented at Intern. Conf. on Murine Leukemia, Philadelphia, 13-15 Oct. 1965. Submitted for Publication

(Contract W-7405-ENG-26)

(ORNL-P-1703; CONF-651038-1) CFSTI: HC \$2.00/MF \$0.50

Mice of the RF strain treated with ionizing radiation, nitrogen mustard, triethylene melamine, or myleran showed a markedly increased incidence of myeloid leukemia and/or thymic lymphoma, depending on their age, sex, microflora, and physiological state when treated, as well as on the conditions of treatment. Urethane, with or without irradiation, did not affect the incidence of either disease. Myeloid leukemias induced by irradiation were by cell-free extracts. Such extracts also increased the incidence of thymic lymphomas. Lymphomas alone were induced by the Rauscher virus. In general, females were less susceptible to the induction of myeloid leukemia than males, which may be attributable at least in part to the effects of estrogen since this hormone inhibits viral transmission of the disease. Germ-free mice appear less susceptible to the induction of myeloid leukemia by irradiation than their conventionally reared counterparts, but are no less susceptible to induction of thymic lymphomas. These observations indicate that a complex interaction among host factors and extraneous agents determines the incidence, latency, hematologic type, clinicopathologic features, and transmissibility of murine leukemia, at least in mice of the RF strain. Author (NSA)

N66-30488* # Public Health Service, Phoenix, Ariz. Communicable Disease Center.

SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Quarterly Report, Apr.-Jun. 1966

24 Jun. 1966 41 p. Its Rept.-14

(NASA Order R-137)

(NASA-CR-76066) CFSTI: HC \$2.00/MF \$0.50 CSCL 06M

Physical work during the period April through June 1966, at the laboratory for monitoring bacterial contamination of space components consisted of the following efforts: (1) recovery studies of incorporated viable spores of *Bacillus subtilis* var. *niger* from plastics by mechanical methods; (2) the evaluation of ultrasonic methods for removing microbial contamination from artificially contaminated surfaces; (3) the use of coated glass slides for high recovery adhesion of microorganisms; (4) survival tests with spores of *B. subtilis* var. *niger* in an ethanol suspension inoculated on polystyrene granules or suspended in water; (5) comparative studies in microbial contamination levels of operating rooms and industrial clean rooms; (6) the selection of spores from *B. subtilis* from heat shock recovery experiments; and (7) the establishment of a sampling room to monitor spacecraft and electrical equipment microbial contaminations. G. G.

N66-30501* # Royal Aircraft Establishment, Farnborough (England).

THE STRENGTH OF BIRDS' WINGS [O PROCHNOSTI KRYL'EV PTITS]

S. N. Shishkin. Jan. 1966 33 p refs. Transl. into ENGLISH from TSAGI Rept. No. 258, Moscow, 1936

(RAE-LIB-TRANS-1146) CFSTI: HC \$2.00/MF \$0.50

The problems of the general strength of birds' wings were studied. An original technique has been used for testing the wings of birds of three kinds: a non-swooping non-migratory bird, a non-swooping migratory bird and a swooping non-migratory bird. We have determined the general bending strength of all the wings in the outspread position, and that of one wing in the half-folded position. We have calculated the

safe speeds of birds in different flight modes, taking the experimental load factors as a starting point. In certain cases we have found by experiment the lines of the centres of flexure, gravity and pressure of the wings which show that the wing of a bird can act as a model of an 'anti-vibration' wing, and also of a wing which undergoes favorable deformation as the loads are increased.

Author

N66-30509# Army Natick Labs., Mass. Food Div.
**CALCULATED INTERNAL RADIATION DOSE FROM IN-
 GESTION OF MEAT STERILIZED BY ELECTRON IRRADIATION**

Thomas G. Martin, III Apr 1966 22 p refs
 (TR-66-26-FD; FD-38; AD-632360) CFSTI: HC \$1.00/MF \$0.50

The production of radionuclides in food irradiated with high energy electrons can be predicted reasonably well with the equation presented by R. A. Meyer. Using this equation and others derived from the reports of the International Commission on Radiological Protection, it is possible to estimate the amount of radiation received by humans consuming meat irradiated by high energy electrons. The estimated annual internal doses decrease with storage time. At the maximum energy treated the dose would decrease from a maximum of 2.36 mrem/year to a minimum of 0.113 mrem/year with a storage time of 7 days and two years, respectively. The calculated values represented approximately 0.1 to 2% of the average mean radiation exposure of humans, 130 mrem/year due to natural environmental radiation.

Author (TAB)

N66-30512# TRACOR, Inc., Austin, Tex.
**A PERFORMANCE-ORIENTED APPROACH TO DETECTION:
 TABLES FOR DETECTION, DISCRIMINATION, AND DE-
 CISION THEORY**

Anne Blocker Blosser 17 Nov. 1965 76 p refs
 (Contract N0bsr-93140)
 (TRACOR-65-267-U; AD-622085)

The possible outcomes of a yes-no signal detection task are outlined, and the relationships among the dependent variables, such as detectability, percent correct performance, and criterion are discussed. A performance oriented approach to detection is considered, and it is pointed out that while two observers may have the same detectability index for a given signal-to-noise ratio, their criteria may differ radically. The percent correct performance of an observer using two different criteria for several a priori probabilities of signal values is shown. Based on these comparisons, tables were constructed to facilitate data analysis of results from signal detection experiments. These tables list the criteria values and maximum possible percent correct performance, as a function of detectability and of the relationship between signal probability and the costs and values associated with each possible outcome of the experiment. The computer programs used in constructing the tables are included.

S.P.

N66-30531# Douglas Aircraft Co., Inc., Santa Monica, Calif.
 Advance Biotechnology Dept.

**INFLUENCE OF PERIODIC CENTRIFUGATION ON CARDIO-
 VASCULAR FUNCTIONS OF MAN DURING BED REST**

P. D. White, J. W. Nyberg, L. M. Finney and W. J. White Jun. 1966 54 p refs
 (Contract NAS9-4166)

(NASA-CR-65422; DAC-59286) CFSTI: HC \$3.00/MF \$0.50
 CSCL 06S

A study was made of the influence of periodic centrifugation on the physiological disturbances associated with ten

days of bed rest. Subjects rode the centrifuge four times each day, the duration of each ride was 20 minutes; the level of acceleration was +2.5 g_z, referenced to heart level. Major findings of this study were that (1) the prescribed protocol of +2.5 g_z for 20 minutes after 12 hours of bed rest exceeded the tolerance of the subjects to positive acceleration; (2) the model conditioning regimen was +1.75 g_z for 20 minutes four times each day; (3) the expected deterioration produced by recumbency in orthostatic tolerance was alleviated by periodic centrifugation; (4) the conditioning regimen was not quite so effective as shorter g time integrals; (5) step function acceleration tolerance and tolerance for sustained acceleration appear to be a sensitive method for measuring the cardiovascular status; and (7) tolerance to positive acceleration declines after 12 hours of bed rest, remains relatively constant, and rapidly improves during ambulation.

Author

N66-30532# Douglas Aircraft Co., Inc., Santa Monica, Calif.
 Advance Biotechnology Dept.

**THE EFFECTS OF CENTRIFUGE RADIUS ON THE PER-
 FORMANCE OF ENTRY TASKS**

W. C. Middleton and W. J. White Jun 1966 32 p refs
 (Contract NAS9-4166)

(NASA-CR-65421; DAC-59274) CFSTI: HC \$3.00/MF \$0.50
 CSCL 05H

Representative entry tasks were performed by 10 subjects under static conditions, and also during exposure to an Apollo entry profile produced at centrifuge radii of 64 in. and 178 in. Performance of a discrete response task and a tracking task decreased between 4% and 22% on the moving centrifuge as compared with performance on the static centrifuge, and it decreased between 12% and 22% on the short as compared with the long-radius centrifuge. Changes of this magnitude are considered to be sufficiently small that they would not invalidate the onboard centrifuge as a testing or training device. Positive transfer of training was obtained in going from a short- to a long-radius centrifuge, but negative transfer was obtained in going from the long- to short-radius centrifuge.

Author

N66-30545# Columbia Univ., New York. Electronics Re-
 search Labs.

**METHODS FOR DETERMINING BLOOD FLOW THROUGH
 INTACT VESSELS OF EXPERIMENTAL ANIMALS UNDER
 CONDITIONS OF GRAVITATIONAL STRESS AND IN
 EXTRA-TERRESTRIAL SPACE CAPSULES Final Report,
 1 Nov. 1960-31 Dec. 1964**

R. F. Shaw and A. F. Sciorra 4 Jan. 1965 235 p refs
 (Grant NSG-112-61)

(NASA-CR-76205; CU-5-65-NASA-112-ERL; F/168) CFSTI:
 HC \$6.00/MF \$1.25 CSCL 06S

The design and development is given of a stable, accurate electromagnetic blood flowmeter to determine blood flow through intact vessels of experimental animals under conditions of gravitational stress and in extraterrestrial space capsules. The flowmeter is operated by a voltage induced in a conductor when it moves in a magnetic field. In this device, the moving conductor is blood and an electromagnet produces the field. Connections to the blood are provided indirectly through the blood vessel walls by electrodes which are an integral part of the magnet support structure. Details are given on receiver and artifact problems, compensation techniques, implementation of a compensated system, amplification of composite signal, timing and demodulating, flow-signal processing, flowmeter operating modes, power supply system, and generation of the magnetic field. Although the device was not chronically implanted in an animal, it was demonstrated with one of the preliminary models that the techniques devised to obviate the effects of artifact signals, which have adversely affected other

flowmeters, did work. Some difficulty was experienced with the probe magnet driver circuit, and a better design was indicated.
L.E.W.

N66-30550# Defence Research Board, Ottawa (Ontario). Directorate of Scientific Information Services.

DATA ON COMPARATIVE MORPHOLOGY OF EXTERNAL EYE MUSCLE RECEPTORS IN VERTEBRATES

D. V. Burnasheva Mar. 1966 13 p refs Transl. into ENGLISH from Cesk. Morfol. (Czechoslovakia), v. 11, no. 1, 1963 p 57-67

(T-450-R; AD-632027) CFSTI: HC \$1.00/MF \$0.50

Data are given concerning only sensory nerve endings of external eye muscle receptors. TAB

N66-30558# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

SELECTION FOR ANTARCTIC SERVICE Interim Report

E. K. Eric Gunderson Mar. 1966 22 p refs (Rept. 66-15; AD-632497) CFSTI: HC \$1.00/MF \$0.50

Environmental conditions, group composition, and work roles at Antarctic scientific stations are described, and possible sources and effects of stress in these environments are indicated. Cultural and psychological characteristics of various Navy and civilian occupational groups represented in wintering-over parties are compared, and the selection problem and procedures are outlined. Personal history, clinical, and self description variables which correlated significantly with three performance criteria are presented for Navy enlisted and 'seabee' groups, providing a summary of characteristics that distinguish the successful Navy man at small Antarctic stations. Author (TAB)

N66-30576# Massachusetts Univ., Amherst.
INHIBITION OF THE SYNTHESIS OF MACROMOLECULES BY ULTRAVIOLET RADIATIONS Progress Report

Paul A. Swenson [1965] 5 p refs (Contract AT(30-1)-3511)

(TID-22352) CFSTI: HC \$1.00/MF \$0.50

It is proposed that the inhibition of β -galactosidase formation in cells irradiated prior to induction is the result of gene inactivation, by dimers acting as blocks to the synthesis of messenger RNA. The results of experiments on the effects of uv irradiation on bacterial cells showed this to be the case. NSA

N66-30585# Oak Ridge National Lab., Tenn.
BIOLOGY DIVISION Semiannual Progress Report for Period Ending 31 July 1965

Nov. 1965 222 p refs

(Contract W-7405-ENG-26)

(ORNL-3853) CFSTI: HC \$6.00/MF \$1.25

Reports are presented on biological research in the following areas: chromosome cytology, fungal genetics, drosophila cytology and genetics, and cytochemistry; cell reproduction, growth, and differentiation; subcellular and viral physiology; radiation microbiology and immunology; mammalian genetics, cytogenetics, and recovery; chemical protection and enzyme catalysis; nucleic acid enzymology and chemistry; biophysics, biochemistry, pathology; plant physiology and photosynthesis; space biology; and NIH-AEC cooperative projects. N.E.N.

N66-30586# California Univ., Los Angeles. Dept. of Physiology.

NON-PHOSPHORYLATING RESPIRATION OF MITOCHONDRIA FROM BROWN ADIPOSE TISSUE OF RATS

Robert E. Smith, Jane C. Roberts, and Karl J. Hittelman [1966] 13 p refs Submitted for Publication

(Grants NsG-721; PHS-G-HD-01826)

(NASA-CR-76215) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

Mitochondria from brown adipose tissue of cold-acclimated rats (6°C) oxidize α -ketoglutarate at a rate twice that of controls (26°C). In both groups, however, the P/O ratio with α -ketoglutarate has never exceeded unity, and is essentially zero with either succinate or α -glycerophosphate. ATPase activity of these mitochondria is very low and is not stimulated by 2,4-dinitrophenol (DNP). Additionally, both respiration and phosphorylation are unaffected by ADP, DNP, bovine serum albumen or glutathione. Endogenous respiration of tissue slices is not stimulated by DNP. It is suggested that brown fat mitochondria are not capable of oxidative phosphorylation, but do phosphorylate at the substrate level. As these findings provide an unusual example of electron transport via an energetically non-conservative pathway, their significance to thermogenesis by brown adipose tissue is particularly emphasized. Author

N66-30613# California Univ., Los Angeles. School of Medicine.

PERINEAL ABSCESS SECONDARY TO GAS GANGRENE: USE OF HYPERBARIC OXYGEN AS A THERAPEUTIC ADJUNCT IN A CASE

A. T. K. Cockett and C. Steven Hatch [1966] 10 p

(Grant NsG-237-62)

(NASA-CR-76242) CFSTI: HC \$1.00/MF \$0.50 CSCL 06E

Hyperbaric oxygen is used in treating a perineal abscess in a 71-year old male with an acute lower urinary tract difficulty associated with a swollen tender mass in the perineum. On the second evening following incision and drainage of the abscess, the patient became acutely ill with gas gangrene which was later shown to be due to Clostridium Welchii. Initial treatment consisted of polyvalent gas gangrene antitoxin, Chloramphenicol, streptomycin, and penicillin in therapeutic concentrations. The following morning he was treated with hyperbaric oxygen of two atmospheres over a 17-hour period. Long-term follow-up reveals no significant complications. M.W.R.

N66-30616# Stanford Univ., Calif. Dept. of Biochemistry.
STRUCTURE AND FUNCTION OF PROTEINS AND NUCLEIC ACIDS Semiannual Progress Report, 1 Jan.-30 Jun. 1966

Arthur Kornberg and Lubert Stryer [1966] 12 p refs

(Grant NGR-05-020-137)

(NASA-CR-76222) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

Potential applications to planetary explorations are considered for research techniques and findings related to the structure and function of proteins and nucleic acids. Nanosecond fluorimetry as a complement to spectral resolutions, selective fluorescent labeling reagents for the detection of macromolecules, and enzymatic synthesis of genetically active DNA are discussed. Progress is also reported in investigations dealing with the use of homopolymer templates to facilitate replication of transforming factor, excited state proton transfer reactions, a conformational change accompanying the activation of an enzyme from *Escherichia coli*, and X-ray crystallographic studies of the alpha-subunit of tryptophan synthetase. M.W.R.

N66-30617# Martin Co., Denver, Colo. Aerospace Div.
HUMAN ENGINEERING DATA AND CONCEPTS FOR HANDLING ADVANCED NUCLEAR SYSTEMS IN SPACE Research and Technology Implications Report

JUL 1965 29 p

(Contract NAS8-11425)

(NASA-CR-76149; CR-65-89) CFSTI: HC \$2.00/MF \$0.50
CSCLO5E

Problem areas are described which were uncovered during a study of systems and equipment for a large orbital research laboratory, the Manned Orbital Research Laboratory, and interplanetary and lunar ferry vehicles. Design data for nuclear space systems, radiation criteria for space operations, maintenance and repair concepts, space suit development, and remote handling operations are discussed. Other problem areas considered are the development of remote maneuvering units and space logistics vehicles, nuclear propulsion vehicle abort, and criteria for removal and packaging of used reactors. The relationship of man to a reactor-type SNAP (System for Nuclear Auxiliary Power) system is discussed, as is advanced program planning. M.W.R.

N66-30618# Joint Publications Research Service, Washington, D. C.

RESULTS OF PHYSIOLOGICAL AND BIOCHEMICAL EXAMINATIONS OF MEMBERS OF THE VOSKHOD SPACESHIP CREW

I. S. Balakhovskiy, P. V. Vasil'yev, I. I. Kas'yan, and I. G. Popov
28 Jun. 1966 21 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 2, Mar.-Apr. 1966 p 212-220

(JPRS-36227; TT-66-32660) CFSTI: \$1.00

Cardiovascular and metabolic responses of the cosmonauts aboard the Voshkod spacecraft are reviewed. Although both crew members tolerated well the 24-hour orbital flight and no significant impairment in their overall health was noted, signs of stress and general fatigue as well as physiological changes were noted which disappeared between three and four days after the flight. Both telemetry measurements and clinical investigations by the cosmonaut-physician are reported. It is noted that cardiac and respiratory rates did not increase as much during this joint flight as during solo flights. Actual descent was found to be more uncomfortable than the effect of acceleration experienced in a centrifuge. M.W.R.

N66-30623# Public Health Service, Washington, D. C. National Center for Health Statistics.

WEIGHT, HEIGHT, AND SELECTED BODY DIMENSIONS OF ADULTS—UNITED STATES, 1960-1962

Howard W. Stoudt, Albert Damon, Ross Mc Farland (Harvard School of Public Health), and Jean Roberts Jun. 1965 55 p refs

(Publ.-1000, Ser. 11, No. 8)

Selected measurements of physique are presented for adults between the ages of 18 and 79 in the civilian, noninstitutional population. Based on findings obtained during the first cycle of the 1960-62 Health Examination Survey, 90% of the men were found to weigh between 126 and 217 lb, with an average of 168 lb. Weight decreased with age from the maximum average of 172 for those 35 to 54 yr old to 150 lb for the 75 to 79 group. Comparable figures for women were 104 to 199 pounds, with an average of 142 lb. Maximum average, 152 lb, is found in the 55 to 64 group; and average weight drops to 138 for the 75 to 79 group. Average height of men is 68.2 in, and for women it is 63.0 in. Data are also given for sitting, knee, elbow rest, and thigh clearance heights; as well as length of upper part of the leg and elbow-to-elbow breadth. Discussed are differences in racial and ethnic groups, socioeconomic levels, and between civilians and military personnel. Numerous tables are included. M.W.R.

N66-30633# Midwest Research Inst., Kansas City, Mo.

A STUDY OF THE MICROBIOLOGY OF SELECTED DEHYDRATED FOOD PRODUCTS Final Report, 15 Oct. 1963-15 Apr. 1965

F. E. Wells Natick, Mass., Army Natick Labs., May 1966 55 p refs

(Contract DA-19-129-AMC-206(N))

(TR-66-35-FD; FD-49; AD-633390) CFSTI: HC \$3.00/MF \$0.50

The effect of freeze-drying on the viability of six species of bacteria on seven kinds of food is presented. Freeze-drying influences are presented and discussed in relation to the effects of freezing, drying and storage conditions. The influence of food type and physiological age of bacteria is shown to influence both immediate losses in viability as well as the rate at which such losses occur during storage. The rate of decline in bacterial viability during storage is discussed as a function of the degree of metabolic injury sustained by the bacteria during the freeze-drying process. Author (TAB)

N66-30640# Archer-Daniels-Midland Co., Minneapolis, Minn.
EDIBLE COATINGS FOR DRIED AND COMPACTED FOODS, PART I Final Report

Morton S. Cole Natick, Mass., Army Natick Labs., Apr. 1966 109 p refs

(Contract DA-19-129-AMC-102(N))

(TR-66-37-FD; FD-47; AD-633044) CFSTI: HC \$4.00/MF \$0.75

Studies are presented on the development of edible barrier materials, their application to dehydrated foods and evaluation under accelerated storage conditions, effects of atmospheric oxygen and moisture, fragmentation and abrasion, and attack by microorganisms. The most effective coating materials include hot melts of acetoglycerides and ethylcellulose; mixtures of monoglycerides and polyglycolesters; protein films including soy proteinate and gelatin; fatty esters of amylose; monoglycerides; hard fats; and combinations of these materials in the form of laminates or mixtures. Approved chemical preservatives, including sorbic acid, potassium sorbate, methyl and propyl p-hydroxybenzoates, were effective in retarding mold growth when incorporated in coating formulations. Author (TAB)

N66-30655# Cincinnati Univ., Ohio.

THE EFFECTS OF SIMILARITY AND REPETITION OF RESPONSE ALTERNATIVES ON VARIOUS TYPES OF PAIRED ASSOCIATE LEARNING Final Report

K. A. Johnson (AMRL), R. J. Senter, and F. W. Smith Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 25 p refs

(Contract AF 33(615)-1046)

(AMRL-TR-65-214; AD-633059) CFSTI: HC \$1.00/MF \$0.50

The investigation was an attempt to find learning materials for which the simultaneous presentation technique would be inferior to other techniques. Subjects learned a 40-item list of paired-associates under one of four training conditions. The stimulus terms were the names of electronic circuits, the response terms, schematic diagrams of electronic circuits. Half the items had distractors that were very similar to the correct response term, the remaining half, distractors that were less similar. Half the items in each of these groups had distractors that were the correct response terms for other items in the list. The remaining items had distractors that were unique to a given item. The overall differences between training techniques were not large, but there was some indication that the five alternative prompt condition was inferior to the remaining conditions. Interactions were found between training conditions and item types, but again the differences involved were not large.

Separate comparisons on the various item types indicated that in no case was the one alternative prompt condition reliably inferior to any of the remaining conditions.

Author (TAB)

N66-30658# North American Aviation, Inc., Downey, Calif. Life Sciences Dept.

EFFECTS OF COLD EXPOSURE UPON THE ACTION OF THERAPEUTIC DRUGS. PART II Second Report. Nov. 1964-Nov. 1965

James Y. P. Chen and H. C. Bergman Ft. Wainwright, Alaska, Arctic Aeromedical Lab., Apr. 1966 24 p refs
(Contract AF 41(604)-2683)
(SID-65-1626; AAL-TR-66-3; AD-633347) CFSTI: HC \$1.00/MF \$0.50

In rats acutely exposed to cold as compared to room-temperature, the toxic responses to parenteral injections of meperidine hydrochloride, of dextroamphetamine sulfate and prochlorperazine ethanesulfonate were invariably greater in cold than at room temperature. With further experiments an even greater increase was noted in the acute oral toxicity of prochlorperazine dimaleate at 4°C, the acute oral toxicity of this drug was 144 times greater at 4°C than at room temperature. This large difference in toxicity appeared to be an additive effect of the inherent hypothermic action of the drug and of the temperature-lowering action in the cold environment. Tests with larger animals, monkeys and dogs, indicated that the differences in toxicity between the room temperature and cold environments were not as great as in rats. The ability of large animals to retain body heat in the cold for a longer time than rats may have contributed to the lesser effect. The results with monkeys injected with prochlorperazine in increasing dosage may have revealed the possibility of a tolerance development to the drug.

Author (TAB)

N66-30671# School of Aerospace Medicine, Brooks AFB, Tex.

CAPILLARY DEVELOPMENT DURING EXPOSURE TO CHRONIC HYPOXIA, 1 JANUARY-30 JUNE 1966

S. Cassin, R. D. Gilbert, and E. M. Johnson Feb. 1966 12 p refs
(Contract AF 41(609)-2421)
(SAM-TR-66-16, AD-633091) CFSTI: HC \$1.00/MF \$0.50

A group of 18 male rats weighing initially 110 to 131 gm. was exposed to a pressure altitude of 20,000 feet for 36 days in a decompression chamber. A similar group of 18 male rats was maintained at sea level for a like period. Hematocrits and organ-to-body-weight ratios were measured for heart, testes, adrenals, and kidneys in all animals at the end of the period. Capillary counts in heart, gracilis, and psoas muscles were made by utilizing a specific stain for endothelial cells. The hematocrit ratio and all measured organ-to-body-weight ratios increased significantly in the chronically hypoxic rats. A significant increase in capillary counts was also found in these animals. On the basis of these preliminary studies, it would appear that in chronic hypoxia, there is an increase in vascularity due to an increase in capillary number rather than an increased patency of existing vessels.

Author

N66-30680# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

POST-FLIGHT CHEST DISCOMFORT IN AVIATORS: AERO-ATELECTASIS

Elihu York 30 Dec. 1965 13 p refs
(NADC-MR-6516, AD-632752) CFSTI: HC \$1.00/MF \$0.50

Three jet pilots recently flew high G bank maneuvers, while breathing 100% oxygen and wearing anti-G harnesses, as part of an in-flight project for weapons systems development. As a consequence, on more than one occasion, all three pilots experienced shortness of breath, cough, and aching in the chest. This latter symptom persisted as long as 3 hours following flight. Physical examination was unremarkable. A pulmonary function study revealed a reduction in vital capacity, immediately following flight, of 20-28% as compared to pre-flight levels outside the plane. A partial, reversible collapse of lung tissue 'aero-atelectasis' may be the mechanism for the observed finding, which could conceivably contribute to aircraft accidents, if not modified.

Author (TAB)

N66-30693# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

QUANTITATIVE EFFECTS OF ABRUPT DECELERATION ON PULMONARY DIFFUSION IN MAN Technical Report, 1 Sep. 1965-1 Feb. 1966

Alan C. Whitehouse, William K. Brown, Peter Foster, and Harris F. Scherer May 1966 20 p refs
(NASA Order T-13335G)
(NASA-CR-76375, ARL-TR-66-12, AD-633170) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Pulmonary diffusion capacity was measured in nine subjects using the steady state method to determine if this physiological measurement was altered by impact. Each subject rode the Daisy Decelerator twice backward (+G_x) at 25 g, twice laterally (-G_y) at 15 g, and experienced one sham ride. Carbon monoxide diffusion capacities were measured immediately before and after each ride, and 3 and 24 hours afterward. No significant change in pulmonary diffusion capacity was associated with impact. There was no correlation between observed and predicted CO diffusion capacity based on oxygen consumption, however, observed CO diffusion capacity and oxygen consumption were highly correlated. The validity of the prediction formula as described by Donevan et al. is questioned, but this may be related to the increased altitude (4400 ft) at which the studies were done.

Author (TAB)

N66-30694# FMC Corp., Santa Clara, Calif.
INVESTIGATION OF DRYING PROCEDURES FOR COMPACTED FOODS Final Report, 18 Mar. 1964-17 May 1965
L. F. Ginette Natick, Mass., Army Natick Labs., May 1966 68 p refs

(Contract DA-19-129-AMC-228(N))
(TR-66-34-FD; FD-46; AD-633267) CFSTI: HC \$3.00/MF \$0.75

Compressed food bars representing protein, carbohydrate and fat in all proportions likely to be encountered with natural products and adjusted to 15-25 percent moisture were dried in a forced draft air drier under controlled conditions to a residual moisture content below 5 percent. Rates of drying were studied in relation to wet and dry bulb temperatures of the air flow, composition of bars, shape of bars, and pressure of compression. Observations were performed to identify the effect of the drying regimen on surface texture, density, migration of fat and soluble components, and organoleptic properties. Conditions for a practical air drying process were defined.

Author (TAB)

N66-30696# School of Aerospace Medicine, Brooks AFB, Tex.

EFFECTS OF PREDNISOLONE AND TRIAMCINOLONE ON CORTICOSTEROID LEVELS IN PAROTID FLUID, SERUM, AND URINE Technical Report, Jun. 1965-Jan. 1966

Robert L. Jenson and Ira L. Shannon Mar. 1966 15 p refs
(SAM-TR-66-24; AD-633119) CFSTI: HC \$1.00/MF \$0.50

A simultaneous determination was made of 17-OHCS in serum, urine, and parotid fluid, by the Porter-Silber reaction, after the oral administration of prednisolone, triamcinolone, or placebo to 240 normal human subjects. The data clearly demonstrate the homology of serum and parotid fluid 17-OHCS levels through a range of 0.22 micrograms to 57.72 micrograms/100 ml. In serum, urinary excretion of steroids was highest following prednisolone, intermediate in the placebo group, and lowest after triamcinolone dosage. Author (TAB)

N66-30697# MITRE Corp., Bedford, Mass.

STUDIES IN DISPLAY SYMBOL LEGIBILITY. PART VIII: LEGIBILITY OF COMMON FIVE-LETTER WORDS

Gary Kosmider, Marion Young, and Glen Kinney Bedford, Mass., AFSC, Electron. Systems Div., May 1966 16 p refs
(Contract AF 19(628)-5165)
(TM-4239; ESD-TR-65-385; AD-633055) CFSTI: HC \$1.00/MF \$0.50

The report describes the findings of a study in symbol legibility which investigated the reading time and errors for common five-letter words when they are projected by a solid stroke and when they are shown by a broken stroke. The latter was produced on a 945-line TV monitor at 10, 7, and 5 active lines per symbol height. With visual size, brightness, contrast, and other viewing conditions controlled, the best reading performance resulted from solid-stroke letters. Broken-stroke letters constructed by resolution of 10, 7, and 5 lines resulted in progressively poorer performances. TAB

N66-30702# School of Aerospace Medicine, Brooks AFB, Tex.

EFFECTS OF HYDRAZINE ON BLOOD GLUCOSE AND MUSCLE AND LIVER GLYCOGEN IN THE ANESTHETIZED DOG Progress Report, Mar.-Nov. 1964

Gale D. Taylor (M.S. Thesis—Texas A&M Univ.) Mar. 1966 16 p refs
(SAM-TR-66-13; AD-633164) CFSTI: HC \$1.00/MF \$0.50

Intravenous injection of diluted hydrazine (25 mg./kg.) into anesthetized dogs caused prompt elevation of blood glucose levels, which reached a maximum in about 2 hours and decreased progressively during 4 hours thereafter. Liver glycogen levels fell rapidly during the first 4 hours after injection of hydrazine. Depletion of liver glycogen stores was associated with severe hypoglycemia and some depletion of muscle glycogen. Packed cell volume progressively increased after hydrazine administration. Microscopic examination of liver tissue from treated dogs showed swelling of hepatic cells and apparent fatty infiltration. Sections of liver stained with PAS confirmed the rapid glycogen depletion. It is postulated that hydrazine affects the carbohydrate concentration of various tissues by a primary insult to the glycogenetic-glycogenolytic mechanism of the liver. Author (TAB)

N66-30704# California Univ., Los Angeles. Dept. of Engineering.

UPPER EXTREMITY PROSTHETICS RESEARCH, HUMAN TRACKING, SENSORY MOTOR CONTROL, MYOELECTRIC CONTROL Progress Report, 15 Jan.-15 Apr. 1966

John Lyman 15 Apr. 1966 20 p refs
(Contracts V1005P-9779; N125(60530)32857A; AF 33(615)-1969; Grant VRA-RD-120IN-64)
(Rept.-66-28; AD-633250) CFSTI: HC \$1.00/MF \$0.50

Contents: Upper extremity prosthetics research; experimental investigation of the Heidelberg pneumatic arm; experimental investigation of the Northwestern attitudinal controlled elbow; experimental investigation of the French

electric hand; exploration of minor surgical methods for developing new body control sites; exploration of new harnessing techniques for transducers; evaluation of tentative design criteria for externally powered prostheses. Research on sensory motor control: experimental investigations of the AIPR pneumatic arm; experimental investigations of functional muscle isolation by training; development of an external logic system for prosthetic motion control. Research on the performance of human operators of tracking system: function generator; reports; experimentation. Research on myoelectric control systems: unidimensional EMG control to a self-paced input; unidimensional EMG control to a step input. TAB

N66-30707# Naval Air Development Center, Johnsville, Pa. **HUMAN BIOCHEMICAL PARAMETERS OF ACCELERATIVE STRESS Final Report**

Elihu York, Nicholas J. Colosi, and John H. Roediger 13 Apr. 1966 20 p refs
(NADC-MR-6603; AD-632817) CFSTI: HC \$1.00/MF \$0.50

Acceleration stress conditions were imposed on four healthy subjects riding the human centrifuge. Blood biochemical analyses were performed on all subjects, with the demonstration of an increase in blood glucose following centrifugation in three of the four subjects, two of whom developed blackout. All four subjects developed greyout. The changes in blood sugar may suggest a relationship between epinephrine secretion and graduated acceleration stress resulting in physiological changes in the subject. Changes in pooled plasma phospholipid fractions were demonstrated in blood samples obtained before and following acceleration; these changes suggest that acceleration may interfere with intracellular energy transfer mechanisms involving phosphorylated compounds associated with oxidative metabolism. The preliminary results of the pilot project indicate that further biochemical measurements may be desirable in assessing acceleration tolerance in man. Author (TAB)

N66-30714# University Coll., London (England). Phonetics Lab.

[PHONETICS LABORATORY] PROGRESS REPORT

A. J. Fourcin, ed. Sep. 1965 75 p refs
(Contract AF 61(052)-692)

(AFCL-66-169; AD-633350) CFSTI: HC \$3.00/MF \$0.75

Contents: Duration and spectral form as cues in the recognition of English and German vowels; perception of time intervals; pitch mediation by temporal mechanisms; experiments with delayed auditory feedback; formants in Vietnamese vowels of different tones; measurement of trans-glottal impedance; fricative synthesis with an acoustic model; spectral analysis; direct random recording of synthetic speech stimuli; automatic audiometer; dependence of stress judgments on vowel formant structure. TAB

N66-30731# Applied Psychological Services, Wayne, Pa. Science Center.

STUDIES INTO INFORMATION PRESENTATION THROUGH NOVEL METHODS: INFORMATION TRANSFER THROUGH ELECTROCUTANEOUS STIMULATION

Arthur I. Siegal, Richard S. Lanterman, and Douglas H. MacPherson Apr. 1966 98 p refs
(Contract DA-28-043-AMC-00186(E))

(ECOM-00186-7; AD-632735) CFSTI: HC \$3.00/MF \$0.75

International Morse code reception, one dimensional-tracking, and probabilistic decision making with electrocutaneous signals were investigated. It was found that trained Morse operators can receive electrocutaneously presented Morse code after only brief training. After as much as 19 to 22 hours of electrocutaneous Morse reception training, the

operators' performance with electrocutaneous signals had not reached their performance levels with auditory signals. No difference was found between electrocutaneous and visual, one-dimensional tracking or between probabilistic decision making with the two modes of reception. Author (TAB)

N66-30732# Naval School of Aviation Medicine, Pensacola, Fla.

COMPARISON OF THREE EXERCISE DEVICES FOR THE ELECTROCARDIOGRAPHIC STRESS TEST

Raphael F. Smith 2 Nov. 1964 17 p refs

(NSAM-906; AD-632680) CFSTI: HC \$1.00/MF \$0.50

The master two-step test, Harvard step test, and the bicycle ergometer have particular features that are useful in testing different groups of patients. In order to have interchangeability of these tests, it is necessary to determine work loads that are equivalent and to consider the factors that influence physiological stress. This report describes the relationship of net oxygen consumption and external work, and graphs are included from which comparison of the oxygen cost of work tasks can be obtained. The oxygen cost of the double Master test was found to be less than for the lowest practical level of work of the Harvard step test. The 20 steps per minute rate on the Harvard step device was found to be essentially the same as the 150 watt load on the Lanooy ergometer, for the military population with a more uniform, muscular physique. Adjusting the exercise load according to weight may introduce variability of stress rather than eliminate it. Author (TAB)

N66-30745# Pennsylvania State Univ., University Park, Dept. of Psychology.

SOME EVIDENCE FOR CODING PROCESSES DERIVED FROM CLUSTERING IN FREE RECALL

Charles N. Cofer Apr. 1965 9 p refs

(Contract Nonr-656(30))

(TR-4; AD-620190) CFSTI: HC \$1.00/MF \$0.50

Clustering in free recall has often been interpreted as arising from use of the category name as a coding response. Data relevant to this interpretation are presented and interpreted with regard to three free recall situations in which clustering is observed. It is concluded that category names do not play roles in clustering in the category clustering situation or in the difference in clustering found for sets of words which comprise all the items of a category as compared with word sets which do not exhaust a category. However, there is evidence that the greater clustering found for categorized pair members than for non-categorized pair members with equal associative overlap may be due to the greater codability of the categorized pairs. Author (TAB)

N66-30746# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.

A STANDARD TECHNIQUE FOR TEMPORAL BONE PREPARATION Joint Report

Makoto Igarashi 2 Mar. 1966 52 p refs /ts Monograph-13 (NASA Order R-93)

(NASA-CR-76281) CFSTI: HC \$3.00/MF \$0.50 CSCL 06P

The inner ear end organs are structurally fragile with the membranous labyrinth weakly supported within the bony labyrinth. The technique of histological preparation must be directed toward preserving the anatomical relationship of the inner ear structures and minimizing post-mortem changes. The densely ossified petrous portion of the temporal bone must be decalcified and the inner ear spaces uniformly infiltrated with celloidin, all the while maintaining the histological integrity of the membranous labyrinth. This monograph is intended as a guide in the preparation of good temporal bone slides which will make it possible to investigate the correlation

between end organ functions and morphological findings. No fundamental histological information is included, however, as that appears in other publications. The techniques described herein have been found to render the most consistently satisfactory temporal bone preparation. Author

N66-30749# Technology, Inc., Dayton, Ohio.

INVESTIGATION OF STRENGTH OF ISOLATED VERTEBRAE Quarterly Report, 30 Jan.-29 May 1966

Jeremy F. Crocker and Lawrence S. Higgins [1966] 21 p refs (Contract NASw-1313)

(NASA-CR-76296; TI-1313-66-2) CFSTI: HC \$1.00/MF \$0.50 CSCL 06E

Progress is reported in the continuing research to study the strength of human vertebrae under various conditions of static and dynamic loads. The preparation of specimen is described, and a transducer, which was developed to correlate the pressure of the nucleus pulposus with deflection of the annulus fibrosus, is discussed. Additionally, comments are made on a literature search that was conducted to define an approximate value for the strength of the human vertebrae. H.S.W.

N66-30755# Stanford Univ., Calif. Dept. of Genetics.

DETECTION OF OPTICAL ACTIVITY AS A SIGN OF LIFE

John W. Westley Apr. 1966 14 p refs

(Grant NsG-81)

(NASA-CR-76301; IRL-1047) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

Living organisms work against the law of increasing disorder and concentrate order within themselves. One of the most fundamental aspects of this order is the optical purity of those metabolites which are built up into polymers and as a consequence of this, biological processes usually exhibit steric discrimination. Gas liquid chromatographic (G.L.C.) procedures have been developed whereby important metabolites such as amino acids can be scanned for optical activity with very high sensitivity. By using a combination of G.L.C. and mass spectrometry we have found a method of ratio-detection as well as identification of optically active compounds. More recently we have observed that within 24 hours of inoculating non-sterile soil with a racemic mixture of certain substrates, marked changes in the D:L ratio of the unused substrate can be detected. Author

N66-30763# Naval School of Aviation Medicine, Pensacola, Fla.

THE THOUSAND AVIATOR STUDY: SMOKING HISTORY CORRELATES OF SELECTED PHYSIOLOGICAL, BIOCHEMICAL, AND ANTHROPOMETRIC MEASURES Joint Report

Norman E. Lane, Albert Oberman, Robert E. Mitchell, and Ashton Graybiel 27 Apr. 1966 20 p refs

(NASA Order R-136)

(NASA-CR-76264; NAMI-961) CFSTI: HC \$1.00/MF \$0.50 CSCL 06N

During the 1963 follow-up examination in the Pensacola Thousand Aviator Study, smoking history information was obtained by questionnaire of 675 subjects. Concurrent data were collected from clinical examinations, laboratory tests, anthropometry, and personal history variables. Two smoking variables were created, cigarette amount (CA) and cigarette years (CY), each on a scale of 1 to 5 points. From the concurrent data, 62 variables were selected for relevance and general interest to be examined in relation to smoking. Twenty-four of the 62 variables had significant correlations ($p < .05$) with CA, and 16 showed significant relationships to CY. Findings are related briefly to previous research, and

problems of cause-effect isolation are mentioned. It is concluded that results in general support previous findings on smoker-nonsmoker differences. Contributions of the study in delineating areas of research for longitudinal investigation are discussed.

Author

**N66-30764*# Republic Aviation Corp., Farmingdale, N. Y.
STUDY OF THE FECAL BACTERIAL POPULATION OF
CHIMPANZEES Final Report, Oct. 1964-Dec. 1965**

Phyllis E. Riely May 1966 230 p refs

(NASA Order R-25; Contract AF 29(600)-499)

(NASA-CR-76265; ARL-TR-66-13) CFSTI: HC \$6.00/MF \$1.25 CSCL 06C

Cultures isolated from rectal swabs obtained from 100 chimpanzees and two fecal samples from five chimpanzee handlers were studied. The data obtained from the aerobic bacterial studies were summarized in tables grouping the occurrence of the enterobacteriaceae, streptococcus, and miscellaneous aerobes so that comparisons could be made with the results obtained on two prior studies. The data of the occurrence of the anaerobic bacterial cultures were summarized in tables as obligate or facultative anaerobes, using the same method of grouping the cultures as in prior studies. Differences in the anaerobic character of chimpanzees and human fecal populations was noted—the percentage of obligate anaerobes exceeding 90% for the human cultures, and ranging between 26% and 71% for the chimpanzee cultures. A literature survey was conducted to aid in the evaluation of the potential pathogenicity of bacterial strains isolated from the chimpanzee. A remarkable similarity exists in the aerobic flora of primates, although differences in the pathogenicity of particular species of bacteria for various primate hosts have been reported in the literature. Carrier states are prevalent in the chimpanzee. The anaerobic fecal population of the chimpanzee differs from man.

Author

N66-30766*# Naval School of Aviation Medicine, Pensacola, Fla.

BIOCHEMICAL CHANGES OCCURRING WITH ADAPTATION TO ACCELERATIVE FORCES DURING ROTATION

James K. Colehour and Ashton Graybiel 25 Apr. 1966 16 p refs

(NASA Order R-93)

(NASA-CR-76289; NAMI-959) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Four young men lived in a continually rotating room, 15 feet in diameter, for a period of six days. Rotational velocities on succeeding days were: 6.4, 6.4, 8.6, 10.0, 6.4, and 3.2 RPM. Stress effects measured as increased excretion rates of 17,21 dihydroxypregnane-20-ones, eosinopenia, hyperventilation, and nausea were observed on the first day of rotation. However, adaptation was rapid, and no further stress effects were observed even with increased rotational velocity. Mild degrees of hypercalciuria, hypercapnia, and decreased norepinephrine excretion rates were observed during the last four days of the experiment as a result of the increased time spent in recumbency.

Author

N66-30785*# Naval School of Aviation Medicine, Pensacola, Fla.

A NOTE ON THE DOSIMETRIC INTERPRETATION OF RIGIDITY SPECTRA FOR SOLAR PARTICLE BEAMS

Hermann J. Schaefer 26 Apr. 1966 20 p refs Joint Rept. with NASA

(NASA Order R-75)

(NASA-CR-76283; NAMI-960) CFSTI: HC \$1.00/MF \$0.50 CSCL 06R

Three flux/rigidity spectra are established theoretically covering the full variability range of all flare events of the past solar cycle and are evaluated dosimetrically. It is found that, of the components heavier than protons, only alpha particles contribute substantially to total exposure. The fractional alpha dose in the tissue surface behind 0.1 g/cm² shielding grows from 40 percent for $P_0=50$ Mv to 400 percent for $P_0=300$ Mv. The alpha dose shows a much steeper drop with increasing depth than the proton dose and would require microsensors for accurate measurement. For the alpha and medium heavy components, the relative biological effectiveness (RBE) shows a pronounced transition in near surface regions which further steepens the drop of RBE dose equivalents as compared to rad doses. The extremely strong and nonlinear dependence of the rad and rem dose distribution on rigidity sharply limits the usefulness of the rigidity concept for dosimetric evaluations and indicates the need for direct measurements of local rad and rem doses on the astronaut's body.

Author

N66-30789*# National Aeronautics and Space Administration, Washington, D. C.

OXYGEN UTILIZATION OF THE ORGANISM AND ITS REGULATION

N. A. Agadzhanian et al Jun. 1966 205 p refs Transl. into ENGLISH of "Kislородnyy Rezhim Organizma i Yego Regulirovaniye". (Kiev) Kiyevskaya Knizhnaya Tipografiya, 1965 Abstracts of papers presented at a symp. held in Kiev-Kanav. 24-29 May 1965

(NASA-TT-F-420) CFSTI: HC \$5.00/MF \$1.25 CSCL 06P

A collection of excerpts from papers on the oxygen metabolism in mammals, under conditions of hypoxia, includes topics on: effect of induced hypoxia in trained and untrained human subjects; oxygen utilization control by regulatory mechanisms; psychological and biochemical aspects of altitude hypoxia; and biological oxidation. Some conclusions based on results of animal and human experiments, readings of cardiograms, electroencephalograms, pneumotachometry, etc., comprise: Systematic training, up to hypoxia, during postnatal ontogenesis decreased the oxygen (energy) consumption and respiratory rate. Animals kept at partial vacuum (180 mm Hg) with body temperature artificially maintained at normal level showed a high mortality rate, proving the protective effect of the natural hypothermia induced by hypoxia. Encephalograms indicated that the cerebral cortex is most affected by hypoxia. The upper limit of partial oxygen pressure for prolonged inhalation is placed at 3 atm. abs. Suggested measures for improvement in body function include increase in ionized oxygen content of inspired air in enclosed space; active physical training under high-mountain conditions; rational breathing exercises in the altitude chamber; addition of CO₂ to the respiratory air during hyperventilation to increase the oxygen uptake of the brain; etc.

Author

N66-30791*# Texas Christian Univ., Fort Worth.

THE EFFECTS OF STRESS ON SMALL GROUP PERFORMANCE

Fred E. Fiedler 8 Dec. 1965 33 p refs

(Grant NGR-44-009-008)

(NASA-CR-76333) CFSTI: HC \$2.00/MF \$0.50 CSCL 05J

The results are presented of a study on the effects of stress on leadership and group performance. The study consisted of two phases: one dealt with the contribution which the leader and the members of a group make in performing a task under varying conditions of stress, while the other concerned the type of leadership style which is most appropriate to group performance.

R.N.A.

N66-30795* # California Univ., Berkeley. Dept. of Nutritional Sciences.

NUTRITIONAL REQUIREMENTS AND BREEDING BEHAVIOR OF PEROGNATHUS Semiannual Progress Report, 1 Jan.-30 Jun. 1966

[1966] 6 p ref

(Grant NGR-05-003-118)

(NASA-CR-76327) CFSTI: HC \$1.00/MF \$0.50 CSCL 06B

During this period a number of nutritional supplements were tested in an effort to induce and maintain estrus in *Pernognathus*. The attempts were unsuccessful and are possibly due to the maintenance of an unfavorable photoperiod. Purina mouse breeder chow and a fully synthetic diet were found to maintain weight in a group of *P. Baileys*. A simple apparatus was assembled for use in estimating oxygen consumption and therefore caloric requirement. R.N.A.

N66-30798* # Texas Christian Univ., Fort Worth.

A MODEL FOR THE SOCIAL SYSTEM FOR THE MULTIMAN EXTENDED DURATION SPACE SHIP

S. B. Sells [1965] 12 p refs

(Grant NGR-44-009-008)

(NASA-CR-76330) CFSTI: HC \$1.00/MF \$0.50 CSCL 05E

The conditions of isolation, confinement, and other stresses to which extended duration space crews will be exposed are unprecedented and many of the problems are not yet understood. Hypotheses directed toward principles to optimize crew organization and adaptation must be generated from present knowledge. Extrapolations might be attempted from various literature sources of human experience in extreme situations. However, the appropriateness of such generalization depends on the system similarity of the various situational contexts to that of the spaceship. A model social system for such microsocieties was constructed and system profiles of eleven well known system patterns were compared with that postulated for the extended duration spaceship. Greatest similarity was found for submarines, exploration parties, naval ships and bomber crews, and least for shipwrecks and disasters, industrial work groups, and prison groups. Author

N66-30805# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.

DEVELOPMENT AND EVALUATION OF A RADAR AIR TRAFFIC CONTROL RESEARCH TASK

Richard G. Pearson, Clifton E. Hunter, and Gilbert L. Neal Dec. 1965 34 p

(AM-65-31)

A system is described in which various elements of the radar air traffic controller's task can be presented repeatedly, reliably, and concurrently to each of six experimental subjects seated at separate task consoles. Programming of display conditions designed to test such operator skills as vigilance, problem solving, monitoring, and reaction time, and the electronic scoring of subject responses are accomplished automatically. Results from initial experimentation involving enroute ATC, terminal, and flight service station personnel support the design rationale for the experimental task. Approximately 8 hours of practice are required for subjects to integrate effectively all subtasks and to achieve a stable level of proficiency. Suggestions are made for use of the system in human factors research on ATC operator problems and for modification as a training device. Technical appendixes include description of a complete problem script and of the electrical-engineering design characteristics of the programming-data-acquisition system. Author

N66-30821# Brookhaven National Lab., Upton, N. Y. Biology Dept.

RELATIVE BIOLOGICAL EFFECTIVENESS OF DIFFERENT TYPES OF IONIZING RADIATIONS: CYTOGENETIC EFFECTS IN MAIZE

Harold H. Smith [1965] 4 p refs Presented at Symp. on Mutational Process, Prague

(Contract AT(30-2)-GEN-16)

(BNL-9383; CONF-650814-1) CFSTI: HC \$1.00/MF \$0.50

The frequency of yg_2 events in leaves grown from irradiated Yg_2/Yg_2 maize seeds shows a linear response to dose. Compared with 250 kVp X-rays, the approximate relative biological effectiveness (RBE) of monoenergetic neutrons (0.43 to 14.7 MeV) is between 50 and 100, of muons (7 BeV) 0.76, of π^- mesons (8 BeV) 3.2, and of protons (28 BeV) 4.4. These results were considered in terms of dose average linear energy transfer (LET) and whether or not nuclear interactions take place. Application of microdosimetric concepts to this system indicates that the interphase chromosome is broken, to cause a yg_2 event, when a charged particle delivers an energy of approximately 93 keV to a spherical region of the cell nucleus that is approximately 1 micron in diameter but proportional to nuclear size. Author (NSA)

N66-30887# Weizmann Inst. of Science, Rehovoth (Israel). **THE APPLICATION OF CLONED HAEMOPOIETIC CELLS IN RADIATION PROTECTION** Progress Report No. 4, 1964-1965

Michael Feldman [1965] 6 p refs

(Contract AT(30-1)-3173)

(TID-22503) CFSTI: HC \$1.00/MF \$0.50

Experiments were carried out to test the effects of transfusion-induced polycythemia on the formation and differentiation of cell-specific clones. Polycythemic and uninjected, X-irradiated mice were inoculated with $1, 2, \text{ or } 5 \times 10^4$ bone marrow cells from syngeneic donors. The polycythemic animals showed a 3-fold decrease in the total number of macroscopic nodules as compared to normal X-irradiated recipients. The polycythemic animals showed a complete suppression of erythroid clones. It was concluded that polycythemia appears to specifically suppress the formation of erythroid clones. It was also found that oxygen is a necessary, although it may not be a sufficient, factor in preventing erythroid clone formation. NSA

N66-30962# Institut d'Embryologie Experimentale, Nogent-sur-Marne (France).

STUDY OF RADIATION EFFECTS ON THE EMBRYO AND ITS ORGANS IN VIVO AND IN VITRO [ETUDE DE L'EFFET DES RAYONNEMENTS SUR L'EMBRYON ET SES ORGANES IN VIVO ET IN VITRO] Research Report, 1 Oct. 1964-30 Sep. 1965

Brussels, EURATOM. [1965] 14 p refs In FRENCH

(Contract EURATOM-039-64-10 BIOF)

(EUR-2643-f)

The effects of X-rays on germ-cells, the migratory power of these cells, and DNA synthesis in geonocytes in chickens were studied by means of labelling with tritiated thymidine. The effects of X-rays on the physiology and respiratory metabolism of the chick embryo intestine and heart was investigated extensively. Certain biochemical effects of X-rays on coenzyme I and its glycohydrolase are reported. The mode of action of chemical and radioprotective agents, such as cysteamine, was studied in an embryonic organ cultivated *in vitro*. Certain early radiation lesions were detected by electron microscopy. The radiosensitivity of the natural inductor in amphibians was measured, as also

was the teratogenesis action of radiomimetic substances such as nitrogenated mustard gas. Irradiation experiments were carried out on cancerous nodules cultivated *in vitro* and a number of regeneration problems were solved with the aid of X-irradiations.

Author (NSA)

N66-30963# Louvain Univ. (Belgium). Laboratoire de Cyto-genetique.

EFFECTS OF MICRO-IRRADIATIONS OF CHROMOSOME SEGMENTS. MORPHOLOGICAL, BIOCHEMICAL AND GENETIC CONSEQUENCES [EFFETS DES MICRO-IRRADIATIONS DE SEGMENTS CHROMOSOMIQUES. CONSEQUENCES MORPHOLOGIQUES, BIOCHIMIQUES ET GENETIQUES] Final Report

Brussels, EURATOM [1965] 44 p In FRENCH

(Contract EURATOM-001-61-7 BIOB)

(EUR-2518-f)

The experimental procedures are described that were developed for the micro irradiation of chromosomes with ultra-violet X-rays, and alpha particles. Results obtained in studies on the effects of radiation on chromosomes in developing pollen grains in culture are reported.

NSA

N66-30964# North Texas State Univ., Denton. Dept. of Biology.

OXYGEN UPTAKE IN RAT BRAIN TISSUES X-IRRADIATED IN VITRO

James R. Lott and John F. Hines [1965] 24 p refs Presented at the 13th Ann. Meeting of the Radiation Res. Soc., Philadelphia

(Contract AT(40-1)-3270)

(CONF-650560-17)

The changes in oxygen uptake in various brain tissues in rats X-irradiated *in vitro* was determined manometrically. The specific areas studied were: the cerebral cortex, the thalamus, mid-brain, and pons-medulla. The doses of X-irradiation used were 10 and 20 kR. The important findings were that the Q_{O_2} values of isolated brain tissues show a decreasing metabolic gradient from cortex to brain stem that can be altered with X-irradiation; respiration of the cortex and pons-medullary tissues were inhibited during the second hour post-irradiation following 20 kR, whereas, the thalamic and mid-brain tissue slices exhibited little change to these doses; and the changes observed occurred in the absence of circulating humoral agents indicating a localized effect of the ionizing radiation. The results were discussed in terms of changes in biochemical integrity, permeability, and on the basis of differences in cellular morphology of the tissues studied.

NSA

N66-30965# Rochester Univ., N. Y. Dept. of Radiation Biology.

BIOCHEMICAL ASPECTS OF RADIATION INJURY AND RECOVERY

Sol M. Michaelson, Charles R. Angel, Kent T. Woodward, and Joe W. Howland [1965] 9 p Presented at the 13th Ann. Meeting of the Radiation Res. Soc., Philadelphia

(Contract AT(30-1)-1286)

(CONF-650560-15) CFSTI: HC \$1.00/MF \$0.50

Principles of physiology and biochemistry were utilized in studies to assess late manifestations of ionizing radiation. Biochemical indices among beagles that survived whole- and partial-body exposure to 1 MeV X-rays were correlated for comparison of relative sensitivities of vital processes

in various portions of the animal's body. Altered biochemical activity in relation to diminished physiologic reserve capacity are of significance in delineating radiation injury and repair processes and the animal's ability to respond to superimposed and interposed stresses.

Author (NSA)

N66-30977# Sloan-Kettering Inst. for Cancer Research, New York.

BIOLOGICAL AND CLINICAL DOSIMETRY Annual Progress Report, Jul. 1, 1964-Jun. 30, 1965

John S. Laughlin 6 Jul. 1965 80 p

(Contract AT(30-1)-3510)

(NYO-3510-14) CFSTI: HC \$3.00/MF \$0.75

During the period of this report local dose microcalorimeter previously described was employed to examine the depth-dose distribution produced in carbon by high energy electrons. Cavity ionization measurements were made in the same geometry and corrected to dose in rads with and without the polarization correction. It is significant that at large depths where the electron energy was low the absolute values of dose obtained by these two methods agree. At lesser depths the polarization correction was required to bring the two methods into approximate agreement. The significance of some remaining discrepancy at higher energies is being further investigated. An intercomparison of the dose produced by high energy electron beams as measured at different institutions was instituted. Both the lithium fluoride thermoluminescent dosimeter and the Fricke ferrous sulphate dosimeter have been under extensive development with respect to different methods of packaging for mailing, procedures for optimum reproducibility, etc. A significant difference between the dose in rads as measured by lithium fluoride luminescence and by the Fricke ferrous sulphate dosimeter between cobalt-60 gamma rays and high energy electrons was discovered. The significance of this unexpected dependence of lithium fluoride thermoluminescence on radiation quality is being investigated. Measurements of the dose produced by the electrons from a high intensity source (600 kev field emission generator) have been initiated. Doses of the order of megarads delivered in 30 nanoseconds have been measured with cellophane dye and thermoluminescent methods. A calorimeter is being designed to carry out these measurements on a more absolute basis. The investigation of solid state detectors uncovered a temperature dependence. A further effect involving a change in current output from the detectors under prolonged irradiation was found to be associated with the effects of ionized air on the surface of the devices. Irradiation in vacuum eliminated this.

NSA

N66-31053# Oak Ridge National Lab., Tenn.

EFFECTS OF UV-IRRADIATION ON MACROMOLECULAR SYNTHESIS IN *ESCHERICHIA COLI*

P. A. Swenson and R. B. Setlow 1965 42 p refs

(Contract W-7405-ENG-26)

(ORNL-P-1331) CFSTI: HC \$2.00/MF \$0.50

Several sensitive and resistant strains of *E. coli* B were examined for some of the factors that influence the inhibition of DNA synthesis by uv irradiation and some factors related to the repair of uv lesions. The quantitative analysis of the inhibition of DNA synthesis is described in terms of a model in which a pyrimidine dimer acts as a complete block to DNA synthesis. Effects of uv irradiation on RNA and protein synthesis in radiation resistant and sensitive strains are shown.

Author (NSA)

N66-31077# California Univ., Berkeley. Lawrence Radiation Lab.

COMBINED EFFECT OF SPACE-FLIGHT FACTORS ON CERTAIN FUNCTIONS OF AN ORGANISM [KOMBINIRO-VANNOYE VOZDEYSTVIYE FACTOROV KOSMICHESKOGO POLETA NEKOTORYYE FUNKTSII ORGANIZMA]
G. M. Frank, N. N. Livshits, M. A. Arsen Eva, Z. I. Apanasenko, L. A. Belyaeva et al 1965 82 p refs Transl. into ENGLISH of Acad. of Med. Sci. of the USSR Preprint No. 17 Presented at 2nd Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965
(UCRL-TRANS-1232; CONF-650668-3) CFSTI: HC \$3.00/MF \$0.75

The results of studies on the effects of space flight conditions, including acceleration, vibration, ionizing radiation, and combinations thereof, on physiological functions, oxidizing metabolism in the central nervous system, and cell division in hematopoietic tissues in guinea pigs, mice, rabbits, and rats exposed to simulated conditions on the ground and during the flight of satellites, led to the conclusion that the different physiological changes that occur under the influence of acceleration or vibration result in a number of disturbances of cell division and that this in turn can alter the radiation effect. The diversity and complexity of a combined exposure to dynamic factors and irradiation are discussed. Author (NSA)

N66-31084# Oak Ridge National Lab., Tenn.

RELATIVE BIOLOGICAL EFFECTIVENESS OF BETA DOSES ON THE SKIN COMPARED TO GAMMA DOSES ON THE WHOLE BODY. IN THE CASE OF CONTAMINATION OF THE TERRAIN, ON ONE HAND, AND IN THE CASE OF CONTAMINATION OF CLOTHING, ON THE OTHER

S. Pretre Apr. 1965 11 p Transl. into ENGLISH from Bull. ABC No. 7 (France)
(ORNL-TR-969)

The relative biological effectiveness of β particles on the skin and whole-body γ radiation were compared. The terrain was assumed to be uniformly contaminated by a mixture of fission products such as that found after a nuclear explosion. Using the criteria presented, it was concluded that β particles from the terrain were of approximately one order of magnitude smaller than the γ radiation from the terrain; the β dose from clothing uniformly contaminated by a mixture of fission products was approximately one order of magnitude greater than the γ radiation from the clothing; and the radiation dose due to clothing was of the same order of biological effectiveness as that due to the terrain. NSA

N66-31090# Oak Ridge National Lab., Tenn.

PHOTOPRODUCTS IN IRRADIATED BACTERIAL SPORES: NO THYMINE DIMERS

J. E. Donnellan, Jr. and R. B. Setlow [1965] 9 p refs
(Contract W-7405-ENG-26)
(ORNL-P-1113) CFSTI: HC \$1.00/MF \$0.50

B. megaterium spores labeled with tritiated thymidine were irradiated with monochromatic ultraviolet light and the spore DNA analyzed for thymine containing photoproducts. No thymine dimers were observed, but large amounts of new thymine photoproducts were found. The unknown photoproduct was produced *in vitro* by irradiation of DNA dried in the presence of various salts. NSA

N66-31114# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

PSYCHOPHYSICAL METHODOLOGY. II: COMPARISON OF MEANS AND OF STANDARD DEVIATIONS OF THE ASCENDING AND DESCENDING METHOD OF LIMITS

Robert M. Herrick 31 Dec. 1965 17 p refs
(NADC-MR-6508; AD-628995) CFSTI: HC \$1.60/MF \$0.50

Assume that the probability of a 'Yes' response increases as the stimulus intensity increases. Then, on the basis of probability considerations alone (a) the mean threshold of the descending method of limits (DML) is greater than the mean threshold of the ascending method of limits (AML) and (b) σ of the DML threshold distribution may be greater than, equal to, or less than σ of the AML threshold distribution. Therefore, (a) the present method for evaluating errors of expectation and habituation is erroneous, (b) the 'just not noticeable difference' (jnd) should always be larger than the 'just noticeable difference' (jnd), (c) conclusions about relative precision based on a comparison of σ s are wrong. Author (TAB)

N66-31119# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

AN ANALYSIS OF THE INERTIAL PROPERTIES AND PERFORMANCE OF THE ASTRONAUT MANEUVERING SYSTEM Final Report, Oct. 1964-Aug. 1965

Julius A. Tieber and Robert W. Lindemuth Wright-Patterson AFB, Ohio, AF Medical Res. Labs., Dec. 1965 25 p refs
(AMRL-TR-65-216; AD-622443) CFSTI: HC \$6.00/MF \$1.25

To predict the system performance in space, the inertial properties of the astronaut maneuvering system (AMS) were determined. An existing mathematical model of the human body was revised and improved on the basis of improved regression equations and additional anthropometric dimensions. A mathematical model of a space suit was designed on the basis of measurements of suited subjects and suit weight regression equations. These models were combined into a model of a suited body. A computer program calculated the inertial properties of this model and compared them with experimental data. Results indicated the following: (1) Horizontal accelerations are more efficient than vertical accelerations; (2) The effects of inertial cross-coupling cause considerable loss of efficiency in roll and yaw maneuvers; (3) System performance is better with smaller astronauts, not just because of inherently higher accelerations, but also higher efficiency factors; (4) Variations in attitude deadband width have no significant effect of performance; (5) Inertial cross-coupling and center of gravity and line-of-thrust misalignment will make attitude control difficult while performing maneuvers in the manual control mode. Author (TAB)

N66-31129# Aberdeen Proving Ground, Md. Army Limited War Lab.

BIOSENSING TECHNIQS FOR HUMAN DETECTION. II: THE FROG SKIN TRANSDUCER: A CONTINUOUS FLOW SYSTEM FOR MAKING CRITICAL MEASUREMENTS

Alfred T. Kornfield and Max Krauss Aug. 1965 18 p refs
(TM-65-02; AD-621268) CFSTI: HC \$1.00/MF \$0.50

Earlier results in which transmembrane potential changes were elicited across frog belly skin by a number of compounds were duplicated. Four additional compounds were tested, including dimethyl sulfoxide. Dimethyl sulfoxide has no apparent adjuvant action when tested with urea. Measurements were attempted using low concentrations of test compounds by an expanded scale technique. The static 2-chamber cell is not suitable for this type of measurement. A continuous flow cell was assembled and tested. This system should permit critical measurement of effects of low concentrations of heat substances and it also provides a point of departure for design studies leading to development of a practicable field detection instrument. Author (TAB)

N66-31162* Teledyne Systems Corp., Hawthorne, Calif.

ELECTRICAL RESISTANCE OF THE SKIN

2 Nov 1964 28 p refs Prepared for Spacelabs, Inc.

(Contract NAS4 566)

(NASA-CR-57212) CFSTI: HC \$2.00/MF \$0.50 CSCL 06P

The function and structure of the skin is reviewed, and the primary sources of skin resistance are identified as the stratum lucidum and stratum corneum. Examples are given to show that different subjects can yield differing skin resistance measurements; the factors causing these variations are listed as size and type of electrode, bodily area measured, temperature of this area, whether the external current passing through the subject is ac or dc, the size of this current, and whether it remains constant or varies with the change of resistance. The relationship between sweat glands and skin resistance is also considered. Based on these data, models of skin impedance are constructed, and a schematic of a pair of single mesh biogrids and the associated skin resistances is presented. The figure indicates that the electrical path from the source to the subcutaneous layer is a short circuit. The vertical resistors have their lower ends shorted together in each biogrid square, and represent the path from the skin's surface to the subcutaneous tissues. It is assumed that the subcutaneous tissue has negligible resistance in comparison to the resistance of the stratum corneum and stratum lucidum. M G J.

N66-31163* North American Aviation, Inc., Los Angeles, Calif.

DEVELOPMENT AND TESTING OF A PROTOTYPE RESPIRATION ANALYZER Final Report

J. W. Raeke and D. M. Walton 14 Dec 1964 81 p

(Contract NAS4-367)

(NASA-CR-57209, NA-64-1298) CFSTI: HC \$3.00/MF \$0.75 CSCL 06B

The components of the respiration analyzer for in-flight monitoring of human subjects and the test procedures used are described. Details are given on the carbon dioxide, oxygen, pressure, and temperature sensors, and the mass flowmeters. Test runs at ground level and at 25,000 ft were conducted. It was concluded that the accuracy and response characteristics of the various prototype components are satisfactory except for the pressure sensor. The characteristics of the oxygen analyzer were considered outstanding. It was further concluded that the parameters chosen for measurement gave a satisfactory indication of total respiratory function. It is pointed out that provisions must be made for transferral of analyzer output to tape for data reduction on an analog computer. N. E. N.

N66-31164* Autonetics, Anaheim, Calif. Research, Engineering, and Reliability Div.

THEORETICAL ASPECTS OF METAL-ELECTROLYTE INTERFACES Final Report

V. W. Bolie and L. G. Bishop 14 Sep. 1964 66 p refs

(Contract NAS4-566)

(NASA-CR-57211, C4-1472/3111) CFSTI: HC \$3.00/MF \$0.75 CSCL 06B

Characteristics of bioelectrodes and chemical electrolysis cells, and difficulties encountered in monitoring human bioelectric activity are discussed. Skin surface electrodes, gross implantable electrodes, microelectrodes, and associated problems in both in-vivo and in-vitro applications are discussed. Anatomical structure and physiological variables pertinent to measurement of galvanic skin responses and electrode design are given. A study of metal-metal salt combinations in chemical electrolysis cells resulted in the prediction that the electrolyte tends to concentrate in the vicinity of one electrode, and to deplete in the region near the other. It is pointed out

that electrochemical potentials can be used to predict contact potentials at interfaces, and rate processes at the electrodes can be used to predict chemical electrode potentials. A new technique using surface field effect transistors for measuring skin potentials is outlined. Measurements on a copper-copper sulfate cell show that the system has reactive impedance and exhibits a resonance at 210 cps. N. E. N.

N66-31221* Franklin Inst., Philadelphia, Pa. Research Labs

EFFECTS OF REPRODUCIBLE MAGNETIC FIELDS ON THE GROWTH OF CELLS IN CULTURE Final Report, May 1, 1965-Apr. 30, 1966

M. H. Halpern [1966] 31 p

(Contract NSR-39-005 020)

(NASA-CR-75121, Q-B2375-4) CFSTI: HC \$2.00/MF \$0.50 CSCL 06F

The combined results are presented of experiments on a series of plant and animal specimens which were exposed to magnetic fields varying in intensity from near zero (less than one milligauss) to higher than ambient (1100 oersteds maximum). Test conditions and environmental parameters are summarized. For the near-zero magnetic fields, tabulated data are presented on the growth of *Euglena*, *Chlorella*, *Colpidium*, *Paramecium Caudatum*, and *Paramecium Multimicronucleatum*. Experiments were also conducted to determine the effect of a magnetically field-free environment on white clover and wheat seed germination; the findings are tabulated. The effect of exposure to magnetic fields greater than ambient, as compared to controls, is also summarized. It was concluded that the general effect seems to be one of growth acceleration in the very low field; in the higher than ambient fields, growth inhibition is indicated. M. G. J.

N66-31234* Woods Hole Oceanographic Institution, Mass. DATA FILE ON AMINO ACID DISTRIBUTION IN CALCIFIED AND UNCALCIFIED TISSUES OF SHELL-FORMING ORGANISMS

Egon T. Degens and Derek W. Spencer Jun. 1966 250 p

Its Reference No. 66-27

(Grants NSR-22-014-001; PRF-1943-A2)

(NASA-CR-76381) CFSTI: HC \$6.00/MF \$1.50 CSCL 06A

Information is presented, for the study of calcification in biological systems, on: (1) type, locality, and environment of sample organism; (2) analytical techniques; (3) digital computer utilization; and (4) quantitative amino acid analysis (tabulated results). A series of mollusks and a few other shell-secreting invertebrates were investigated. The selection of specimens was made purely on biological grounds so as to cover a wide phylogenetic range from ancestral to derived, i.e., primitive to highly evolved, forms. Moreover, an attempt was made to incorporate a certain number of marine specimens coming from habitats characterized by water temperatures of -2° to $+40^{\circ}$ C, salinities from 10 to 80‰, and water depth from 1/2 meter to about 100 meters. The primary objective of the study was to show the significance of the shell-protein variation to the environment and molluscan phylogeny. In addition, the amino acid composition of the mantle, the periostracum, and the ligament was determined for a number of specimens to gain more insight into factors governing the calcification of the shell organic matrix. D. T.

N66-31286* Bell Helicopter Co., Fort Worth, Tex.

EVALUATION OF THE RH-2 COCKPIT MOCK-UP

James G. Curtin, Dora J. Dougherty, and John H. Emery Aug. 1965 85 p refs

(Contract Nonr-4429(00))

(D228-410-001; AD-633106) CFSTI: HC \$3.00/MF \$0.75

This study represents one in a series of evaluations of the JANAIAR concept of an IFR flight display system. The purpose of this experiment was to determine the feasibility of the cockpit layout and sub-panel design in terms of accessibility, operability in real time, the effect of training, and the performance of the required procedures. A concurrent objective was to examine means of improving the tested design. Testing was performed in a mock-up of the JANAIAR Research Helicopter Number Two (RH-2) located at Bell Helicopter Company's Flight Simulation Laboratory. Five subject pilots learned and performed procedures for all flight test maneuvers. The procedures encompassed all manipulatory tasks to be performed throughout the simulated flight. Performance measures taken included: number of errors committed and time required to perform the procedures. Summary analyses of the findings indicate: (1) the time allowed to perform the required procedures is realistic and sufficient so as to preclude overburdening a single operator in flight, (2) some control knobs and selectors were inconveniently located on the right side of the panel, and (3) minor revisions were indicated to optimize procedures performance. The significance of the results is discussed and recommendations for optimum control design are noted. Author (TAB)

N66-31306# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DRUGS FOR RADIATION PROTECTION

L. A. Tiunov, G. A. Vasilyev, and E. A. Val'dshteyn 17 Feb. 1966 587 p refs Transl. into ENGLISH of the book "Protivoluchevyye Sredstva" Moscow, Izd. Nauka, 1964 318 p (FTD-TT-65-556/1+2; TT-66-61282; AD-633268) CFSTI: HC \$8.85/MF \$2.50

The reference book contains data on more than 1000 preparations described up to 1963. Data published in "Protivoluchevyye Sredstva" (drugs for radiation protection, pub. 1961), are not repeated. Bibliographical data are compiled at the end of the book; references are listed alphabetically and numbered. The efficiency of the protection (sensibilization) is expressed by the factor of dose variation of the radiation dose administered to the subject to be protected in order to achieve the same effect as on irradiation without protection. The structural formulas are given in the form represented by the authors of the references. Structural formulas and synonyma of preparations described in the reference book of 1961 are not given. Because of the great influence of the oxygen effect on the action of drugs for radiation protection, the composition of the gaseous medium during the irradiation is given whenever possible. Absence of such data means that the irradiation was carried out in air. Apart from new preparations, the most important data published before 1961 are mentioned if they were not described previously for some reason. TAB

N66-31314# Army Foreign Science and Technology Center, Washington, D. C.

PLASTICS AND SYNTHETIC POLYMERS IN MEDICAL MICROBIOLOGY

V. N. Tarasov May 1966 13 p refs Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), no. 12, 1965 p 121-126 Presented at All-Union Conf. on the Uses of Polymers in Med. and Med. Ind., Leningrad, 29 Oct. 1964 (FSTC-HT-23-85-66; AD-633208) CFSTI: HC \$1.00/MF \$0.50

A survey of the published literature on the utilization of plastics and other polymeric materials in microbiology and virology is presented. Emphasis is placed on the use of

polystyrene, polymethylmethacrylate, polyamides, polyethylene and other plastics and synthetic polymers as materials for growing cell, tissue and virus cultures, performing serological investigations, freezing tissues and cells, and producing antibacterial and antiviral preparations. Author (TAB)

N66-31322# Bell Helicopter Co., Fort Worth, Tex.
CONTACT ANALOG SIMULATOR EVALUATIONS: NUMERIC AUGMENTATION OF GRID PLANE ENCODEMENT
J. H. Emery and Carl A. Koch Dec. 1965 35 p refs
(Contract Nonr-4429(00))
(D228-420-007; AD-633107) CFSTI: HC \$2.00/MF \$0.50

Measurement was made of the ability of a group of helicopter pilots to perform simulated rotary wing maneuvers under three instrument display conditions which augmented the JANAIAR contact analog vertical display with numeric information, moving tape scales, moving pointer scales and digital readouts. Each presented with the basic grid plane were compared with each other and the basic grid plane alone. The numeric information displayed included indices of altitude, heading and airspeed. The display conditions were tested under: (1) a relatively stable cruise task and (2) a variable terrain following task. Measures of altitude control, airspeed control, heading control and appropriate collective control inputs were recorded. Results indicate that numeric information significantly enhanced performance when presented in conjunction with the contact analog and that the moving tapes and the moving pointers each produced significantly better performance scores than the digital readouts. These results were consistent in both helicopter tasks tested. Author (TAB)

N66-31335# Indiana Univ., Bloomington.
PHYSIOLOGICAL AND SUBJECTIVE ADAPTATION TO SHOCK: A DISCREPANCY
Robert M. Stern and Larry Gaupp May 1966 12 p refs
(Contract Nonr-908(15))
(TR-12; AD-632893) CFSTI: HC \$1.00/MF \$0.50

The purpose of the experiment was to compare subjective and physiological adaptation to 15 repeated electric shocks of the same intensity. Twenty-four subjects received shocks at the highest level they would tolerate. Twenty-four others received shocks at their predetermined annoying level. All subjects were told that shock intensity would vary from trial to trial and that their task was to rate the intensity of each shock. The data for both groups show that there was no physiological adaptation, as determined by size of GSRS, but there was significant subjective adaptation. The results are accounted for in terms of special qualities of the stimulus electric shock. Author (TAB)

N66-31381*# Union Carbide Research Inst., Tarrytown, N. Y.
THE GENERAL AND COMPARATIVE BIOLOGY OF TERRESTRIAL ORGANISMS UNDER EXPERIMENTAL STRESS CONDITIONS Semiannual Report
S. M. Siegel 1 May 1966 78 p ref
(Contract NASw-767)
(NASA-CR-76409; UCRI-383) CFSTI: HC \$3.00/MF \$0.75
CSC L 06M

To correct the statement that ultraviolet light on Mars would prevent existence of any earth-type life, various terrestrial organisms were tested under ultraviolet fluxes of 400,000,000 Erg-cm⁻² or more. Animal species, vascular plants, and other forms of terrestrial life subject to experimental stress conditions are discussed, as well as the relationship between ultraviolet radiation and oxygen. The germination of allium and the growth of a variety of organisms

in ammonia-rich environments is described. Unlike NH_3 , which supported the germination of about 75% of 30 varieties and allowed only 10% germination at most, 0.01 M Na or KOH at the same pH (12) permitted at least minimal germination in all varieties. Germination in the 50% to 80% range was fairly commonplace in the alkalies and green shoots. A review of preliminary experiments is presented for the microbiology of ultra-saline, acidic, and other extreme chemical environments. Lymphocytes are used to demonstrate that membrane-monitored stress responses lead to increases in white cell number in a discussion on the relation of permeability to environmental stress. S.P.

N66-31386# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PROBLEMS OF THE PHYSIOLOGY AND PATHOLOGY OF THE HIGH MOUNTAINS

K. Yu. Akhmedov, I. G. Kalinicheva, and O. G. Lorents, ed. 4 Jan. 1966 290 p refs Transl. into ENGLISH of the publ. "Voprosy Fiziologii i Patologii Vysokogor'va" Dushanbe, Izd. Akad. Nauk Tadzh. SSR 1963 195 p (FTD-TT-65-1320/1+2, AD-631637) CFSTI: HC \$6.00/MF \$1.50

Conference papers are presented relating to physiological and pathological changes which occur in the high mountains originating in Tadzhikistan and Kirgizia, U.S.S.R. For individual titles see N66-31387-N66-31416. M.W.R.

N66-31387# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN GAS METABOLISM IN HYPOXEMIA

A. D. Slonim. In *its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 5-15 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Changes in the oxygen demand during hypoxemia lead to the conclusion that the tissue adaptation mechanism of an organism to oxygen deficiency is closely related to the excitation state of the skeletal muscles and to metabolism in muscle tissues. Both reactive (transport) and areactive (tissue) adaptation to mountainous conditions are discussed; as are phenomena observed during exposure to these higher altitudes. Three groups of data are presented relating to the influence of hypoxemia on general gas metabolism. In one group, the problem of lowered gas metabolism is discussed when partial pressure of the atmospheric oxygen is lowered to the point at which total or partial disruption of the oxidative process in the tissues results. Another group of phenomena, observed during comparatively short stays in the mountains, is manifested in a rise in the general metabolism; a third group of observations involves a lowering of the general gas metabolism at low and medium altitudes. M.W.R.

N66-31388# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN PECULIARITIES IN THE REACTION OF THE HUMAN ORGANISM TO RESIDENCE IN THE HIGH MOUNTAINS OF KIRGIZIA

M. M. Mirrakhimov. In *its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 16-29 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Adaptive reactions during short- and long-term residence at high altitudes are found to vary with different localities. A stay in the Tien-Shan area causes a decline in general metabolism, but is not accompanied by as distinct a reaction as by exposure to the Caucasus or Alps. It is observed that a 30-day stay at 1750 meters in the Tien-Shan mountains does not lead to change in circulatory or hematogenetic functions of

16 male students, whereas the literature indicates marked changes following similar exposure in the other mountains. When 43 young men were observed at 3300 meters, there was a consistent rise in respiration and pulse, and a decline in both systolic and diastolic pressure. Self-observations are reported for six men who spent the first three days of an expedition at 2200 meters and the next 47 days at 3200 meters. Venous pressure diminished with altitude, but arterial pressure varied with the individual. Pulse and respiration rose during the first three days, then returned to initial values; by the end of the expedition pulse rates were lower than the initial values. M.W.R.

N66-31389# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

METABOLISM AND INTERACTION OF VITAMINS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

B. M. Braginskiy. In *its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 30-43 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

An attempt was made to determine the balance of riboflavin, thiamine, nicotinic acid, and ascorbic acids following large pharmacological doses of riboflavin, folic acid, biotin, and vitamin E given to inhabitants of the Eastern Pamir where the altitude is between 3200 and 4200 meters. Normally these inhabitants show a riboflavin deficiency, but a 7-day administration (50 mg internally each day) of riboflavin produces an increase which approaches that found in a control group. Changes in blood riboflavin content are also seen following single dose and seven-day administration of vitamin E. For these people, it is stated that when prescribing large doses of vitamin E, biotin, and folic acid, it is also necessary to specify riboflavin as a supplement. Vitamin E does not noticeably affect the excretion of N-1-methylnicotinamide in the Pamirians, while it makes such excretion disappear in a control group. There is no change in excretion following the administration of folic acid, although there is a decrease in content of the DPN oxidized form in the blood; biotin promotes a decrease in both excretion and DPN. M.W.R.

N66-31390# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BALLISTOCARDIOGRAPHIC OBSERVATIONS UNDER THE CONDITIONS OF THE PERIOD OF ADAPTATION TO THE HIGH MOUNTAINS

I. P. Plotnikov. In *its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 44-48 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Ballistocardiographic investigations were made of 28 individuals who stayed for several months at an altitude of 4200 meters in the Pamir area. It is concluded that the cardiovascular system possesses extensive adaptive capabilities and is the first system to react to changes in the external environment. Both a quickening of the pulse and an increase in the force of the systolic surge are noted until the sixth through ninth weeks of the sojourn in the high mountains, whence these indexes began to decline. A gradual increase in the strength of the cardiac contractions takes place; and the increase in the amplitude of the diastolic wave and the H wave confirm data indicating an increase in the load on the right ventricle as a result of a rise in pressure in the pulmonary circuit. M.W.R.

N66-31391# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF MUSCULAR EXERTION ON HUMAN CUTANEOUS BLOOD FLOW UNDER LOWLAND AND MOUNTAIN CONDITIONS

B. D. Zabudskiy *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 49-53 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Cutaneous capillary blood flow is found to increase in human beings exposed to an altitude of 4200 meters during the Pamir expedition, and the increase is more pronounced in practically all cases for which physical exertion is noted during the measurements. A radiometric method of studying isotope resorption is used as the index of capillary blood flow in the skin. It is noted that different types of shifts in resorption rates occur at lower altitudes; for which acceleration, slowing down, and no changes are recorded. M.W.R.

N66-31392# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PRESSURE IN BRACHIAL AND TEMPORAL ARTERIES IN CERTAIN PSYCHIC DISORDERS AND IN HEALTHY INDIVIDUALS UNDER THE CONDITIONS OF THE WESTERN PAMIR

B. T. Mamkin and N. Ye. Shilina *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 54-57 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Results of arterial blood pressure measurements are reported for both emotionally and physically disturbed and healthy individuals living in a mountainous area with altitudes between 2200 and 3100 meters. It is noted that most of the individuals who exhibited temporal hypertonia did not complain of headaches or dizziness and had no clinical symptoms of vascular disease. In almost half of the schizophrenics examined, temporal hypotonia with a low temporal-brachial index corresponded to a decrease in blood pressure in the brachial artery. There is no general agreement between pressures in the temporal and brachial arteries, and only in hypertonia do the temporal pressure and the temporal-brachial index generally increase with an increase in the systolic pressure in the brachial artery. M.W.R.

N66-31393# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

KAVETSKIY'S TEST AT VARIOUS ALTITUDES

B. D. Zabudskiy and O. G. Lorents *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 58-63 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

A simple skin test using trypan blue is used to study the relationship between changes in connective tissue physiology and length of stay at various altitudes, as well as the effect of descent from mountainous areas to low altitudes. Suppressed physiological behavior of the connective tissue is noted when individuals who normally live at low altitudes spend two months at an altitude of 4200 meters. The functional state of the connective tissue rises when the group descends to the initial altitude of 800 meters, although it takes two months for functioning to return to normal. M.W.R.

N66-31394# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARATIVE STUDY OF BONE-MARROW HEMATOGENESIS AND THE PERIPHERAL BLOOD IN RABBITS UNDER THE CLIMATIC AND GEOGRAPHICAL CONDITIONS OF THE EASTERN PAMIR

O. I. Andreyeva and T. G. Chernova *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 64-69 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

High-mountainous conditions are found to exert a stimulating influence on bone-marrow hematogenesis, which is accompanied by a significant increase in erythrocyte count in the peripheral blood, according to experiments conducted

in the eastern Pamir on 32 rabbits. When the rabbits were taken from 824 meters to an altitude of 3800 meters, it was found that red stem cells were stimulated preferentially during the first 10 to 15 days at the higher altitude. The content of erythroblast elements increase, while the leukocyte-erythrocyte ratio diminishes. The bone-marrow reaction sets in during the first few days, reaches its highest level in five to 10 days, and is stabilized by the 20th day. Maximum erythrocyte, averaging a 49% increase, is on the 20th day. Hemoglobin content rises progressively and reaches a maximum, 30% increase, on the 20th day. Since the erythrocyte count increase is faster than that of the hemoglobin content, there is a diminishing in the color index. A slight increase in total leukocyte count is noted at the end of the observations. M.W.R.

N66-31395# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE PROBLEM OF HEMOPOIETINS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

Yu. B. Bobodzhanov *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 70-74 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Changes in peripheral blood of rabbits was studied following single 1.5-ml intramuscular injections of hemoglobin and urine from human subjects who had previously been studied at altitudes of 800 and 3600 meters. The studies on the rabbits, made at an altitude of 3600 meters, indicate that following injection of urine the reticulocyte content increased sharply from the first day, reached a maximum on the third day, and returned to normal on the sixth or seventh day. The administration of blood serum resulted in a greater increase in reticulocytes; the highest level was reached by the fourth day, the decline began on the fifth day, and a return to normal was noted by the eighth to tenth day. The erythrocyte count and hemoglobin content increased following both injections taken from humans who lived at high altitudes. From these and similar results, it is concluded that the hematopoietic substances which appear in the serum and urine of the inhabitants of high mountainous areas are probably produced on a lifetime basis. M.W.R.

N66-31396# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SEGMENTATION INDICES OF NUCLEI OF PERIPHERAL-BLOOD NEUTROPHILS IN THE LOCAL POPULATION OF THE EASTERN PAMIR

M. M. Mansurova and M. O. Olimbayeva *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 75-82 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Examination of more than 200 native inhabitants of the eastern Pamir region where the altitude is more than 4200 meters indicates a hypersegmentation of peripheral blood neutrophils, which is shown by a high Hynek index and a right shift of the Arneth index. Similar, although less distinct, nuclear segmentation was observed in a native population living at an altitude of 860 meters. It appears that the peculiarities of the latter group are not related to either the altitude or thyroid gland functioning. M.W.R.

N66-31397# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FUNCTIONAL STATE OF THE THYROID GLAND IN HUMAN SUBJECTS LIVING UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

Yu. V. Sergeyev *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 83-87 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

No pathological changes were observed in the thyroid glands of 54 health individuals who spent six months at an altitude of 4200 meters and then returned to a valley at 800 meters in the eastern Pamir. The depression of thyroid activity during the stay in the mountainous area is attributed to adaptation to oxygen insufficiency. Following descent to the lower altitude and for one month after the descent, there is continued suppression in thyroid functioning. This is attributed to the inertia of the recovery processes of the thyroid gland, which is further aggravated by the relatively high temperatures and humidity observed at the lower altitude. It is noted that radioactive iodine dosages of two microcuries do not influence thyroid gland functioning. M.W.R.

N66-31398# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF CERTAIN VITAMINS ON THE EXCRETION OF 17-KETOSTEROIDS AND CHLORIDES WITH THE URINE IN LOCAL INHABITANTS OF THE EASTERN PAMIR

B. M. Braginskiy and I. M. Mirzoyev *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 88-94 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Single-dose and seven-day internal treatment with 500 µg of biotin results in significant increases in excretion of 17-ketosteroids and decreased excretion in chlorides in the urine of local inhabitants of the eastern Pamir who live at an altitude of 5700 meters. This is considered to suggest that biotin has a stimulating effect on adrenal cortex functioning, and is also observed following pharmacological dosages of vitamin E. Administration of 30 mg folic acid leads to a considerable drop in excretion of 17-ketosteroids and increase in chloride excretion, apparently indicating depression of adrenal cortex functioning; similar results are obtained with pyridoxane. M.W.R.

N66-31399# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF CORTISONE ON THE REACTIVITY OF THE ORGANISM UNDER LOWLAND AND MOUNTAIN CONDITIONS

G. L. Mednik and V. A. Prokhorov *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 95-103 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

A sharp drop in the production of antibodies to typhoid O-antigen is observed following the administration of 5 mg subcutaneous injections of cortisone acetate to rabbits living in lowland regions. Antibody production is more sharply inhibited following similar treatment to rabbits living at 3700-meter altitudes. It is considered that cortisone and factors operating in the high mountains are synergistic with regard to influence on the organism; and that the cortisone affects not only antibody production but also the protective capabilities of the organism. M.W.R.

N66-31400# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF CORTISONE AND DESOXYCORTICOSTERONE ON COMPOSITION OF BLOOD IN RABBITS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS AND LOWLANDS

T. G. Chernova *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 104-110 (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

The effects of cortisone and desoxycorticosterone (DOKS) were studied in connection with the healing of wounds in rabbits at their natural habitat at about 820 meters and at an altitude of 3800 meters in the eastern Pamir region. When cortisone was administered at both high and low altitudes, there was an increase in leukocyte count during the first few days after the injury, but this count dropped off progressively so that by the 15th day there were fewer leukocytes than initially. In one group of animals treated with cortisone, the neutrophil content increased and the lymphocytes decreased under the high altitude conditions. In the control group at low altitude, changes in leukocytes were insignificant. At both altitude levels, percentage of eosinophils and monocytes remained almost unchanged. The protective reaction of the organism to injury appears to be somewhat inhibited and drawn out at high altitudes. Administration of cortisone further suppresses this reaction, while DOKS restores the reactive level to approximately that observed at low altitudes. At high altitudes there is a slow increase in erythrocyte count and hemoglobin content in the traumatized animals; this is even slower following injection of cortisone. MW.R.

N66-31401# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF AKTG (ACTH) AND ADRENAL CORTEX HORMONE PREPARATIONS ON THE SURVIVAL OF ANIMALS UNDER THE CONDITIONS OF ACUTE OXYGEN INSUFFICIENCY

O. G. Lorents, V. I. Arav, and L. Yu. Shcherbina *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 111-118 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Comparative effects of cortisone and desoxycorticosterone (DOKS) on the survival rate of rats whose adrenal glands had been removed was investigated, as was the influence of ACTH and cortisone on intact animals. Removal of the adrenals results in a sharp drop in resistance and high mortality in the animals; and cortisone administration improves this resistance, whereas DOKS does not. Stimulation of the adrenal cortex in intact animals or treatment with additional cortisone does not affect the survival rate in acute short-term hypoxia. It was found that the rats were more sensitive to oxygen insufficiency in the summer months, when large doses of cortisone lowered resistance even further. M.W.R.

N66-31402# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STUDY OF THE PROCESS OF ADAPTATION TO HYPOXIA AND ACCLIMATIZATION TO THE CLIMATE OF THE HIGH MOUNTAINS WITH THE PURPOSE OF USING THE LATTER TO TREAT ILLNESSES ASSOCIATED WITH OXYGEN STARVATION

N. N. Sirotinin *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 119-137 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

A general review of the literature is presented relating to adaptation to hypoxia, acclimatization to high-mountainous climate, and treatment of diseases associated with oxygen deficiency. Some data suggest that the early stages of hypertonia might be treated at health resorts in the mountains. Both positive and negative results are reported for bronchial-asthmatics in mountainous areas. Dogs with experimental defects in both sides of the heart adapted well to hypoxia and did not develop additional pathological symptoms during a high altitude expedition. M.W.R.

N66-31403# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE INFLUENCE OF HYPOXIA AND OTHER CONDITIONS PREVAILING IN THE HIGH MOUNTAINS OF TIEN-SHAN ON THE COURSE OF PSYCHIC DISORDERS
N. V. Kantorovich *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 138-146 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Various psychic disorders are found to be affected differently by the climate in high-mountainous areas. Persons in manic states, recent paranoias, and some schizophrenics are found to have remissions when they are transferred to psychiatric aid stations located at an altitude of 3540 meters. No positive results are reported for depressive persons, epileptics, or those diagnosed as in stuporous states; suggesting that such psychopathological syndromes might be treated by hyperoxia, such as use of an oxygen tent. M.W.R.

N66-31404# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE INFLUENCE OF THE HIGH MOUNTAINS ON THE STATE OF THE HUMAN NERVOUS SYSTEM
Ye. N. Kutchak *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 147-154 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Neurological status, motor and sensory chronaxy, and the state of higher nervous activity were observed over a four-month period in 28 individuals who camped at an altitude of 4200 meters. A so-called verbometer technique and an associative experiment were employed; orthostatic and clinostatic tests were made to determine autonomic nervous system influences. Data suggest that a number of disturbances occur under high-mountainous conditions, particularly during the first few days following the change of altitude. These changes include weakening of the inhibitory process in the cerebral cortex; anomalies in the neuromuscular apparatus, such as tremors of the palpebrae and hands and disturbances in equilibrium; reflex disturbances; and considerable changes in chronaxy and pulse frequency. The subjects appeared to make good adjustment to the high altitude because none of the initial symptoms were noted after 1-1/2 months in the mountains. It is noted, however, that some of the subjects exhibited a secondary deterioration after three months; further study is required to determine the reason for this deterioration. M.W.R.

N66-31405# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DATA ON VARIATIONS OF HIGHER NERVOUS ACTIVITY DURING OXYGEN STARVATION
K. Yu. Akhmedov *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 155-171 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

The possibility of developing new conditioned reflexes is investigated in dogs subjected to the effects of oxygen starvation in an altitude chamber with a volume of about 1.5 m³. At a simulated altitude of 3000 meters, it was possible a new type of reflex was observed during the first few days of an experiment in a dog characterized as having a weak-type higher nervous activity; but subsequently there was a decrease in the strength of the reflex. It was not possible to develop differentiation to another type of stimulus, and suppression of cortical activity was accompanied by sluggishness. Experiments conducted without simulated ascent showed the same nervous system disturbances. In a dog with exceedingly strong and balanced nervous processes, a new conditioned-reflex stereotype was developed at an altitude of 8000 meters. The pathological changes noted

at various altitudes in some dogs and the high altitude tolerance and adaptation of others are considered dependent on brain cortex functional performance limit and the strength, balance, and mobility of the nervous system processes.

M.W.R.

N66-31406# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

VEGETATIVE DISTURBANCES IN CERTAIN PSYCHIATRIC DISORDERS AND IN HEALTHY INDIVIDUALS UNDER THE CONDITIONS OF THE WESTERN PAMIR

B. T. Mamkin and N. Ye. Shilina *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 172-174 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Position and ocular-cardiac reflex tests were run on 33 persons with neuropsychiatric disorders who were natives of a high-altitude region; and distorted reactions were obtained in almost half of the schizophrenics within this group. Bulla resorption time was found to be within the normal limits of 40 to 60 minutes for only nine of 123 subjects, who included 50 healthy and 53 disturbed persons from the same area and a control group of 20 healthy persons. Resorption times as short as 10 minutes are recorded; and it is noted that various authors attribute such shortening to local hypoxia, disturbances in connective tissue and colloid-osmotic equilibrium, as well as malfunctioning of the endocrine-autonomic system.

M.W.R.

N66-31407# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF ASCENT TO A MOUNTAIN LOCALITY AND RETURN ON COMPOSITION OF HUMAN BLOOD SERUM PROTEINS

Ye. P. Smolichev *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 175-181 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Twenty clinically healthy young men were examined to determine how transfer from an altitude of 850 meters to one of 4200 meters would affect the protein composition of their blood. During the first month after ascent protein concentration was found to increase; after four months this diminished, but was still above the initial value. Relative albumin concentration dropped immediately after ascent, and by the end of four months it was still below the initial value, although an increase was noted. Relative concentration of alpha and gamma globulins rose immediately and continued to be high, but beta-globulin concentration rose immediately and diminished somewhat by the end of the four months. Absolute concentration of albumin diminished after ascent; alpha and gamma globulins showed a real increase. After descent, no changes in total concentration of protein and albumins were observed; only the relative values for the beta-globulin had changed. Functional changes in the liver are considered to be involved in these changes. M.W.R.

N66-31408# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE INFLUENCE OF THE COMPLEX OF FACTORS OPERATING IN THE HIGH MOUNTAINS ON THE VARIATION OF BLOOD SERUM PROTEINS UNDER X-RADIATION

Ye. P. Smolichev and Yu. T. Ponomarev *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 182-185 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Fourteen rabbits were subjected to 1000 units of external X-ray irradiation under normal and subnormal barometric pressure at an altitude of 4200 meters, and 15 rabbits were

given the same treatment at an altitude of 850 meters. A decrease in total concentration of serum protein and albumins was observed two weeks after X-irradiation at high altitudes, whereas no changes were noted at the lower altitude. M.W.R.

N66-31409# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN PROTEIN COMPOSITION OF BLOOD SERUM AND THE PROCESS OF THEIR REPLENISHMENT IN EXPERIMENT LIVER PATHOLOGY UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

Yu. T. Ponomarev and G. P. Rusakova *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 186-190 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Variation of blood serum protein composition was studied in 20 rabbits who were transferred from their natural habitat of 850 meters to an altitude of 4200 meters. Liver damage in the animals was caused by four subcutaneous injections of 0.5 ml/kg carbon tetrachloride given at 24-hour intervals. Simultaneously with the last injection, the animals were given 0.5 millicurie/kg of sulfur 35 in methionine. Paper electrophoresis combined with radiometry was used to study the protein fractions and S^{35} uptake. Poisoning was more severe, and usually terminated in death, at the higher altitude. Total blood serum protein concentration and beta globulins increased following CCl_4 injection at both altitudes, whereas relative content of albumins decreased. At both elevations more radioactive sulfur was taken up by the albumins than globulins. After poisoning, less S^{35} was incorporated into the albumins and beta-globulins at the higher altitude, but radioactivity was greater in the gamma-globulins. The protein-forming function of the liver is considered to be more impaired at the higher altitude. M.W.R.

N66-31410# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DISTURBANCE OF THE BLOOD SERUM PROTEIN COMPOSITION OF RABBITS IN ACUTE RADIATION INJURY UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

R. S. Rubinov *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 191-198 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Shifts in blood protein composition are investigated at an altitude of 3600 meters in 10 rabbits suffering from acute beta-radiation injury following subcutaneous injection of 2.5 millicuries/g of weight of a $Na_2HP^{33}O_4$ solution. All of the animals died between the 7th and 14th days following the injection. A sharp decrease in leukocyte count is noted on the 1st through 4th days, followed by a leveling off until just before the animals perished. Erythrocyte count falls off slightly on the 6th day, and a decrease in hemoglobin content is noted at the end of the experiment. A decrease in total protein concentration is noted from the 1st day, as are both an absolute and relative decrease in serum albumins and an increase in alpha and beta globulins. While some differences are noted between effects at high and low altitudes, it is concluded that the general trend in shifts in blood serum protein composition remains the same. M.W.R.

N66-31411# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARATIVE HISTOMORPHOLOGICAL DESCRIPTION OF WOUND HEALING UNDER THE INFLUENCE OF CORTISONE AND DESOXYCORTICOSTERONE (DOKS) AT MOUNTAIN AND LOWLAND ALTITUDES

T. G. Chernova *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 199-204 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Onset of inflammatory reaction was delayed in wounded rabbits taken to an altitude of 3800 meters as compared to a control group at a low altitude. When cortisone was administered to other rabbits, there was more weight loss and higher mortality among the wounded rabbits at both altitudes than among the nontreated rabbits. Rapid development of inflammation as well as wound closure followed treatment with desoxycorticosterone (DOKS). Microscopic examination revealed that on the fifth day after the wound was incurred, the group receiving cortisone exhibited alternative inflammation with necrotic phenomena; with DOKS there were beneficial vascular changes. Differences were even more pronounced on the 10th day. Analysis of histological data in connective-tissue formation indicates that healing is slower at higher altitude. Administration of cortisone results in sharp suppression of the regenerative processes, whereas DOKS results in an acceleration of wound healing which is comparable to that which occurs at the lower altitude without treatment. M.W.R.

N66-31412# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FEATURES OF THE SURGICAL STAGE OF ANESTHESIA UNDER THE CONDITIONS OF THE HIGH MOUNTAINS (AN EXPERIMENTAL STUDY)

Yu. I. Datkhayev *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 205-211 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Hemodynamic indices and changes in external respiration, blood gases, and alveolar and expired air is observed in anesthetized dogs who were operated on at an altitude of 3600 meters. Most of the 38 dogs used were transferred from a lower altitude where a control run was made on 20 other dogs. Poorer gas metabolism and more frequent respiration and pulse counts were obtained at the higher altitude. It is found that it is more dangerous to use ether without oxygen at the higher altitude because of a so-called altitude-anesthetic hypoxemia. Acclimatized dogs are shown to be more tolerant of this altitude-anesthetic hypoxemia than are newly transferred animals. M.W.R.

N66-31413# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ETHER CONCENTRATION IN INSPIRED AIR AND IN THE BLOOD DURING ANESTHESIA UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

Yu. I. Datkhayev *In its* Probl. of the Physiol. and Pathol. of the High Mt. 4 Jan. 1966 p 212-218 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

In order to determine optimum ether dosages for use in high-mountainous areas, an investigation was made of the ether concentration in the inspired air and in the blood of 14 transferred and seven local dogs at an altitude of 3600 meters. The animals were anesthetized with pure ether and an ether-oxygen mixture after receiving a morphine injection, and a control group of 10 dogs was similarly tested at a lower altitude. Since the density of ether vapor is considerably lower at high altitudes than in lowland areas, inhalation anesthesia must be administered with a higher ether concentration in the inspired air. If this is not done, it becomes difficult to reach the necessary anesthetized stage; in addition, altitude-anesthetic hypoxemia may result. Acclimatization of the animals appears to play no role in determining optimum ether concentration at the high altitude. M.W.R.

N66-31414# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN DATA FROM RESEARCH ON THE SEXUAL ACTIVITY OF WOMEN RESIDENTS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

Ye. I. Petranyuk *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 219-223 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

On the basis of data collected on 950 healthy females who live at altitudes of between 3600 and 4100 meters in the Murgab district of the Eastern Pamir, it is concluded that this high-mountain climate does not disturb menstrual and child-bearing functions. Females ranging in age from 14 to 77 years were interviewed, with two-thirds of the group between 20 and 45 years old. It was found that the onset of menstruation comes late in women living at these high altitudes, and that no functional changes are exhibited in individuals who must ascend to high altitudes on a daily basis. Each of the permanent female mountaineers interviewed had five or more children. Premature births and stillbirths were rare, and spontaneous abortions occurred in less than one percent of the women of childbearing age. Migration from low to high altitudes does not affect the childbearing function or disturb pregnancies. M.W.R.

N66-31415# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF MOUNTAIN CONDITIONS ON THE PHYSIOLOGICAL INDICES OF THE SADDLE HORSE

N. O. Mamin *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 224-234 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Physiological responses of Karabair saddle horses which are indigenous to the mountains were observed in the state of rest and during physical exertion at altitudes of 2200-2600, 3750-3900, and 4150-4200 meters. A group of horses was driven into a valley, where the altitude was between 700 and 800 meters, so that a comparison could be made. Eight horses were examined in each of the four altitude groups; and no sex differences were found when measurements were made of body temperature, pulse and respiration frequency, hemoglobin, erythrocyte count, and reserve alkalinity. In the low and middle zones these physiological indices were found to be within the normal range for the animals at rest, but in the high altitude zone there is a quickening of pulse beat and other changes. Shifts in these clinical and hematological indices after exertion are found to increase with altitude increases. Recovery after physical exertion becomes slower as the altitude increases. It is concluded, nonetheless, that these Karabair horses are well suited to the conditions inherent in the high-mountain areas. M.W.R.

N66-31416# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A BRIEF CHARACTERIZATION OF THE BACKGROUND OF THE KARA-DZHILGA-KRY LINE (EASTERN PAMIR)

M. M. Tadzhikov *In its Probl. of the Physiol. and Pathol. of the High Mt.* 4 Jan. 1966 p 235-264 refs (See N66-31386 18-04) CFSTI: HC \$6.00/MF \$1.50

Geophysical and meteorological observations were made at an altitude of more than 4200 meters to determine the physical characteristics of the Kara-Dzhilga-Kry line in the eastern Pamir. These included determinations of atmospheric pressure and humidity, air and soil temperatures, wind speed and direction, solar radiation intensity, total illumination of the horizontal plane, atmospheric electric-potential gradient, and ionization and radioactivity in the air. Various tables and

graphs detail the results of this area which has low temperatures, humidity, and atmospheric pressure; high solar radiation intensity; and elevated ionization and radioactivity in the air. M.W.R.

N66-31444# Kansas State Univ., Manhattan. Dept. of Psychology.

THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE

William Bevan et al May 1966 96 p refs

(Contract Nonr-3634(01))

(TR-37; TR-38; TR-39; TR-40; AD-632854) CFSTI: HC \$3.00/MF \$0.75

Contents: Serial Reaction Time and the Temporal Pattern of Prior Signals. Color Coding and the Potency of Anchors and Residuals in the Judgments of Size: A Quantitative Study of Relevance in the Formation of Adaptation Levels: Some Problems in Motivation from the Point of View of the Theory of Adaptation Level. TAB

N66-31493*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CHEMICAL STUDIES ON THE ORIGIN OF LIFE

Cyril Ponnamperna *In VPI Proc. of the Conf. on the Exploration of Mars and Venus* Aug 1965 8 p refs (See N66-31486 18-30) CFSTI: HC \$7.00/MF \$1.75

A series of experiments were conducted on the synthesis of the constituents of the nucleic acid molecule and the protein molecule, during which primitive earth conditions were simulated, to investigate the chemical origin of life. Astronomical spectroscopy has revealed that the most abundant elements in our galaxy are hydrogen, helium, oxygen, nitrogen, and carbon. It has also been determined that the energies available for the synthesis of organic compounds under primitive earth conditions are ultraviolet light from the sun, electric discharges, ionizing radiation, and heat. With these conditions as a starting point, studies revealed that primary molecules or micro molecules could have arisen on the earth devoid of life. In order for these molecules to combine to give more complex arrangements, the removal of a molecule of water is required; two possible mechanisms for this reaction are described. Since it was determined that molecules of biological significance can be synthesized abiologically, it is stated that the finding of biological compounds on the surface of Mars is no indication that life exists there; however, if life is the result of the inevitable evolution of matter, life elsewhere in the universe will be chemically similar to life on earth. H.S.W.

N66-31497*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A FUTURE AUTOMATED BIOLOGICAL LABORATORY

Vance I. Oyama *In VPI Proc. of the Conf. on the Exploration of Mars and Venus* Aug. 1965 14 p refs (See N66-31486 18-30) CFSTI: HC \$7.00/MF \$1.75

Facts are given to support research approaches to an automated unmanned biological laboratory for investigations of life on Mars. The specific objectives of a mission of this type are outlined, and it is stated that if these objectives are met, measurements and assays critical and pertinent to life detection may be obtained. An argument is presented that chemistry alone may not suffice to establish the existence of life, but given such complementary physiological measurements as metabolism, growth, and reproduction, the probability of unequivocal discovery becomes greater. If data from this laboratory positively indicates the presence of racemic

amino acids, it may be strongly inferred that life does not exist on Mars. Various detection techniques are discussed, and their importance in this experiment is evaluated. H.S.W.

N66-31538# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

ADAPTATION TO EXTREME ENVIRONMENTS: PRE-DICTION OF PERFORMANCE Interim Report

E. K. Eric Gunderson Apr. 1966 47 p refs

(Rept-66-17, AD-632996) CFSTI: HC \$2.00/MF \$0.50

The report summarizes a series of studies concerned with environmental and psychological factors related to adjustment or performance in isolated Antarctic groups. These studies were designed to provide support for the Navy's psychiatric assessment program and to aid in selection of suitable military and civilian applicants for service at Antarctic scientific stations. Possible sources and effects of stress in this type of confined environment are considered. Methods developed for the measurement of individual and group performance are described, and results of studies conducted to evaluate the predictive validities of biographical, clinical, and personality data are presented in detail. Studies of emotional and motivational changes during the long Antarctic winter and the relationships of such changes to occupational and social roles, psychological needs, and effective work performance are reported. Author (TAB)

N66-31541# Lockheed Missiles and Space Co., Sunnyvale, Calif.

DEVELOPMENT AND TEST OF A PROTOTYPE ADVANCED BIOMEDICAL SYSTEM Final Report, 19 Oct. 1964-18 Mar. 1966

S. A. Hall and J. B. Taffe Brooks AFB, Tex., Aerospace Med. Div., Apr. 1966 229 p refs

(Contract AF 19(600)-2755)

(AMD-TR-66-1; AD-633063) CFSTI: HC \$6.00/MF \$1.25

The development and ground test of a non-flyable, functional prototype life-support system was undertaken, the system was designed to support a 50-pound chimpanzee, or the metabolic equivalent, for 30 days (with a safety factor of at least 3—to make 90 days) in simulated orbit. The system consisted of a sealed life cell for housing the test specimen and his metabolic support equipment plus a service module for supporting both the life cell and its environmental control system (ECS). The ECS was designed to maintain a sea-level pressure, oxygen-nitrogen environment within the life cell. Following a shakedown test to prove out the hardware without a test subject, a test series, with animals, was initiated. The test objectives were: (1) to obtain engineering data for a future Bioastronautics Flight Research Program, (2) to ascertain the psycho-physiological effects of prolonged confinement in a micro-atmosphere on the test subjects, and (3) to acquire baseline data relative to atmospheric contaminants in the environment for the time in question. A total of 25 days of animal testing was achieved in an altitude and temperature controlled chamber using four different animals. Medical problems with the animals prevented reaching the 30-day goal with a single specimen. However, the ECS operated continuously for the full 30 days without malfunction, and the life-support system successfully demonstrated its adaptability to a flight program. Author (TAB)

N66-31545# National Jewish Hospital, Denver, Colo. Dept. of Experimental Immunology.

BIOCHEMICAL AND PHYSIOLOGICAL FACTORS OF THE IMMUNE RESPONSE Annual Progress Report, 1 May 1965-30 Apr. 1966

Ignatius L. Trapani, Dan H. Campbell, Laszlo Kalmar, and Thomas Mutz 1 Jun. 1966 4 p refs

(Contract Nonr-3545(00))

(AD-632894) CFSTI: HC \$1.00/MF \$0.50

Antibody formation in adrenalectomized rabbits at high altitude is under study. A group of rabbits were acclimatized for 30 days to 10,600 feet at Echo Lake, then bilaterally adrenalectomized. A control group of adrenalectomized rabbits was maintained in Denver. After four weeks of recuperation both groups were given a primary I.V. immunization with bovine serum albumin (BSA). Seven weeks later a secondary immunization with BSA was given. Serum samples were obtained at appropriate intervals and analyzed for precipitating antibody. High-altitude adapted and adrenalectomized rabbits exhibit a depressed primary immune response which reaches maximum titers later than high-altitude controls; the time sequence of the secondary response is similar to controls but the titers achieved are lower. TAB

N66-31583# Army Personnel Research Office, Washington, D. C. Support Systems Research Lab.

TEAM PROCEDURES IN IMAGE INTERPRETATION

Stanley F. Bolin, Robert Sadacca, and Harold Martinek Dec. 1965 41 p refs /ts Tech. Res. Note 164

(AD-480533)

Present study was one in a series concerned with the development of effective image interpreter team techniques and organization. Ten different team procedures were compared with each other and with individual interpreters on eight performance tests based on photography from four aerial surveillance missions of World War II and four missions flown during the Korean war. Degree of cooperation and working methods were systematically varied in 80 matched teams of two or three Army image interpreters. Right and wrong scores were based on a consensus of either two or three team members. Three-man teams, with individuals working independently, proved consistently superior to the average individual interpreter attaining the same level of completeness as the average individual with substantial increases in accuracy. On the eight-mission performance tests used in this experiment, the three-man independent teams had average accuracy scores ranging from 52% to 100% versus 12% to 39% for the average individual. Two-man independent teams also showed gains in accuracy but with reduced completeness compared with individual performance. Author (TAB)

N66-31621# Southampton Univ. (England). Inst. of Sound and Vibration Research.

A REVIEW OF THE ACOUSTICAL CHARACTERISTICS AFFECTING THE INTELLIGIBILITY OF SPEECH

C. G. Rice Oct. 1964 140 p refs

(ISAV-MEMO-119) CFSTI: HC \$5.00/MF \$1.00

This report is a review of researches which have been carried out on the acoustical characteristics (e.g. intensity, frequency, time, amplitude distortion, masking) affecting the recognition of normal speech, and speech that has had information deliberately withdrawn. The effect of these on the intelligibility from the point of view of linguistic or semantic, phonetic and physical interdependent parameters is studied. Synthetic speech, i.e. the generation of speech sounds by the carefully controlled formation and introduction of the acoustical characteristics is also briefly discussed. G.S.

N66-31639* # Smithsonian Astrophysical Observatory, Cambridge, Mass.

SELECTED STUDIES IN EXOBIOLGY, PLANETARY ENVIRONMENTS, AND PROBLEMS RELATED TO THE ORIGIN OF LIFE Semiannual Progress Report No. 1, 1 Oct. 1965-31 Mar. 1966

Carl Sagan Jun. 1966 130 p refs

(Grant NGR-09-015-023)

(NASA-CR-76106) CFSTI: HC \$4.00/MF \$1.00 CSCL 06F

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1. AN ANALYSIS OF THE MARINER 2 MICROWAVE OBSERVATIONS OF VENUS J. B. Pollack and C. Sagan 69 p refs (See N66-31640 18-40)

2. PROPERTIES OF THE CLOUDS OF VENUS C. Sagan and J. B. Pollack 16 p refs (See N66-31641 18-30)

3. THERMODYNAMIC EQUILIBRIA IN PLANETARY ATMOSPHERES E. R. Lippincott (Md. Univ.), R. V. Eck, M. O. Dayhoff (Nat'l. Biomed. Res. Found.), and C. Sagan 37 p refs (See N66-31642 18-30)

N66-31640* # Smithsonian Astrophysical Observatory, Cambridge, Mass.

AN ANALYSIS OF THE MARINER 2 MICROWAVE OBSERVATIONS OF VENUS

James B. Pollack and Carl Sagan *In its Selected Studies in Exobiol., Planetary Environments, and Probl. Related to the Origin of Life* Jun. 1966 69 p refs (See N66-31639 18-04) CFSTI: HC \$4.00/MF \$1.00

Limb-darkening observations of Venus by 19 mm microwave channel onboard Mariner 2 spacecraft were analyzed and compared with ground-based measurements in a hot-surface context. Peak brightness temperatures near the center of each scan, temperatures of the emitting level, and total optical depths of the microwave attenuators were related to the five following capacity models: (1) transition of CO₂ and N₂ throughout the atmosphere; (2) water vapor absorption; (3) aerosol of absorbing dust; (4) isothermal absorbing cloud layer, and (5) an aerosol of scattering particles, arbitrarily distributed with altitude. Results rendered the CO₂-N₂, the water vapor, and the absorbing dust models untenable and suggested that the observed radiation arises from a hot surface and atmosphere. G. G.

N66-31644* # Ling-Temco-Vought, Inc., Dallas, Tex. LTV Astronautics Div

THERMAL TESTS OF A PROTOTYPE GEMINI EXTRA-VEHICULAR SYSTEM

F. H. Goodnight 6 Aug. 1964 58 p refs

(Rept. 00 478)

Evaluated were a prototype space suit system consisting of a Gemini pressure suit, a superinsulation coverall garment, and a prototype life support back pack for their protection capability against the thermal environments of space, and from heating due to propulsion system exhaust plumes. Obtained temperature data on the coverall indicated superinsulation conductance degradation by gas leakage from the suit into the insulation; however, its overall thermal performance was found adequate for astronaut protection. Repeated exhaust plume impingement on the right hand of the insulation garment melted the material at about 500° F during an eleven-second pulse. Tests on the portable life support system were not successful due to some control problems; but data obtained during the test indicated that the water separator functioned properly. G. G.

N66-31704* # Stanford Univ., Calif. Instrumentation Research Lab

MEMBRANE SEPARATION

Jerry Lundstrom Apr. 1966 54 p refs Revised

(Grant NSG-81-60)

(NASA-CR-76431; IRL-1046, Rev.) CFSTI: HC \$2.50/MF \$0.50 CSCL 06F

Permeability coefficients for both glucose and carbon dioxide through a silicone rubber membrane were measured. The experimental apparatus used, and the method of analysis are described. The coefficients were used to estimate the minimum metabolic rate for the conversion of glucose to CO₂ that is detectable using carbon-14 labelled glucose. This metabolic rate can then be equated with CO₂ production rates from glucose for various microorganisms to gain insight into the sensitivity of the membrane separation device in terms of detectable numbers of microorganisms. Detectability estimates in numbers of Escherichia Coli for different values of the experimental parameters of observation time and membrane thickness were worked out and are included. The separation factor (ratio of the steady-state permeability coefficients) of the solutes CO₂ and glucose for a given membrane is discussed. The mathematical relations used for the membrane separation were previously developed and are reported in an earlier paper. L. S.

N66-31741* # Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine

PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT DURING THE PERIODS OF TRANSITION. III: NORTH-SOUTH FLIGHT

G. T. Hauty and T. Adams Dec. 1965 14 p refs

(AM-65-30)

At periodic intervals throughout the biological day, biomedical assessments were made for a week prior to jet flight to Santiago, Chile, for 12 days at Santiago, and for a week following return to Washington, D.C. Although previous East-West and West-East flights effected a primary shift of circadian periodicity, as manifested by physiological functions, the North-South flight did not. There was, however, a significant increase of subjective fatigue, as in the other flights. The significant impairment of psychological performance produced by the East-West but not the West-East flight was not shown by the North-South flight. Author

N66-31762* # Brookhaven National Lab., Upton, N. Y. **BIOLOGICAL AND MEDICAL APPLICATIONS OF RADIO-ACTIVATION ANALYSIS**

Donald C. Borg 5 Apr. 1966 23 p refs Presented at Netherlands Atoomforum, Utrecht, 17 Mar. 1966

(Contract AT(30-2)-GEN-16)

(BNL-10130; CONF-660312-2) CFSTI: HC \$1.00/MF \$0.50

Applications of activation analysis in the fields of biology and medicine are reviewed, and aspects of the program at BNL are discussed. One of the most prominent applications of activation analysis to biology has been the measurement of Na, Cl, K, and P in very tiny amounts of tissue. The other major area of application in the life sciences concerns the detection of trace elements, many of which are present in protoplasm in concentrations of less than one ppm. Relative freedom from contamination has made activation analysis more accurate rather than intrinsically more sensitive in biological trace analyses. The method is compared with conventional radiochemical approaches in analyzing for one or a few elements at a time. A bibliography of 51 references is included. Author (NSA)

N66-31763* # Massachusetts Inst. of Tech., Cambridge.

THE SELECTIVE DESTRUCTION OF MICRONEURONS BY LOW-DOSE IRRADIATION Annual Progress Report and Renewal Proposal with Revised Budget Estimate, Supplement I

[1964] 16 p refs

(Contract AT(30-1)-3045)

(TID-22823) CFSTI: HC \$1.00/MF \$0.50

The multiplying and differentiating cells of the body are highly susceptible to the effects of ionizing radiation. It may be expected, therefore, that the postnatally-forming micro-neurons and glia cells would be selectively destroyed by exposure to low-level γ or X-irradiation. Evidence from the literature is briefly reviewed which is in agreement with this expectation. We plan to undertake experiments in which irradiation of the head (and of specific brain regions, e.g., cerebellum, hippocampus) will be combined with thymidine- ^3H injection in order to determine quantitatively the effect of radiation on the newly-formed, migrating and differentiating cells. This technique of selective extirpation in surviving animals, moreover, will enable us to study the role of microneurons in the organization of behavior.

Author (NSA)

N66-31764# Battelle-Northwest, Richland, Wash. Pacific Northwest Research Foundation.

EFFECTS OF IONIZING RADIATION ON THE TESTICULAR FUNCTION OF MAN Yearly Progress Report No. 3, 1 Jun. 1965-31 May 1966

Carl G. Heller Feb. 1966 78 p refs

(Contract AT(45-1)-1780)

(RLO-1780-1) CFSTI: HC \$3.00/MF \$0.75

Preliminary data from a study of the effects of X-radiation on the testicular function of man indicate that the human system is more sensitive than other mammals for which data are available. The design and calibration of X-ray equipment to deliver a uniform dose to both testes of human beings are discussed. Data are included on the effects of X-radiation doses ranging from 5 R to 600 R total urinary gonadotropins, interstitial cell stimulating hormone, 17-ketosteroids, total estrogens, urinary testosterone, seminal fluid, sperm morphology, germinal epithelium, and spermatogenesis. The timing of spermatogenesis was confirmed, and the effects of various doses of X-radiation on chromosomes were determined. The quantitation of biopsy specimens is discussed.

NSA

N66-31773# Medical Biological Lab., RVO-TNO, Rijswijk (Netherlands).

SURVIVAL OF LYMPHATIC CELLS AFTER X-IRRADIATION IN MICE

O. Vos [1966] 38 p refs Sponsored in part by EURATOM

(MBL-1966-4; TDCK-45629) CFSTI: HC \$2.00/MF \$0.50

Experiments were conducted to determine the radiosensitivity of lymphatic cells, using reproductive integrity as a criterion for survival of the cells. Male F_1 mice were irradiated with a lethal dose of X-rays and injected with enough bone marrow cells from one of the parent strains to secure a high 30-day survival percentage. The LD_{50} for lymph node cells derived from mice of the same parent strains was determined, and survival percentages after irradiation were calculated for irradiated and nonirradiated cells. When the cells were irradiated 4 hr after injection the radiation sensitivity was not altered; however, when irradiation was delayed 24 hr after injection, a small increase in radioresistance was found. These differences did not seem to be due to changes in cellular radiosensitivity. No appreciable differences were observed in radiation sensitivity of lymph node and spleen cells. Intracellular recovery from radiation damage appeared to occur in lymphatic cells within 2 hr after irradiation. The graft-versus-host reaction was felt to be a reliable measure for the reproductive integrity of the lymphatic cells.

L.E.W.

N66-31792# Puerto Rico Nuclear Center, Rio Piedras.

EFFECT OF WHOLE-BODY GAMMA IRRADIATION ON SYNTHESIS AND EXCRETION OF GLUCURONIDES IN RATS

Jorge Chiriboga Dec. 1965 55 p refs

(Contract AT(40-1)-1833)

(PRNC-80) CFSTI: HC \$3.00/MF \$0.50

Urinary excretion of glucuronides and free glucuronic acids in rats was found to be increased during the first 24 hr after irradiation with 1000 R when the rats were starved for 3 days before irradiation. Duodenal tissue from whole-body irradiated rats, tested *in vitro*, had a reduced ability to conjugate anthranilic acid, going down to 30% of the control level 48 hr after irradiation. At 192 hr after irradiation the conjugation again reached the normal level. Glucose added to the medium had no effect on control tissue but increased the conjugation of irradiated tissue. DPN increased the conjugation of tissue from normal animals but had no effect on tissue from irradiated animals. Uridine diphosphate glucose (UDPG) and UDPGA had no effect on normal or irradiated tissue. In live animals given naphthalene intragastrically or anthranilic acid subcutaneously at different intervals after irradiation with 1000 R, excretion of total glucuronic acid (free plus conjugated) was the same as in the controls. Levels of beta-glucuronidase excreted in urine by starved and irradiated rats were found to increase between 48 and 72 hr after irradiation. Urinary excretion of beta-glucuronidase inhibitor in irradiated rats was found to be the same as in the controls. A machine is described for automatic step-gradient elution in column chromatography of soluble uridine nucleotides. Preliminary results are reported on the determination of their specific activity by using ^{32}P in rat tissues.

Author (NSA)

N66-31794# Virginia Univ., Charlottesville. Radiobiology and Biophysics Lab.

THE EFFECTS OF DOSE RATE AND TIME OF IRRADIATION ON DNA SYNTHESIS

L. O. Chang, S. S. Williams, and W. B. Looney [1965] 7 p refs

(Contract AT(40-1)-2889)

(TID-21914) CFSTI: HC \$1.00/MF \$0.50

The radiosensitivity of DNA synthesis was studied in the cell cycle of regenerating rat liver. *In vivo* studies on DNA synthesis in X-irradiated 21-hr regenerating liver showed that: with a given total dose, the slower the dose rate of irradiation administered locally to the liver, the greater is the depression in DNA synthesis, in terms of DNA specific activity; a small dose of radiation (94 R) produces a significant depression in DNA synthesis; and duration of irradiation is the key factor in producing this change, while the effect of dose is secondary. Therefore, it is concluded that the process of DNA synthesis is not radioresistant when low dose rates are employed.

NSA

N66-31795# Virginia Univ., Charlottesville. Radiobiology and Biophysics Lab.

A STUDY OF DNA LABELED CELLS AT DIFFERENT TIMES AFTER RADIATION, PART I

W. B. Looney [1965] 12 p refs

(Contract AT(40-1)-2889)

(TID-21907) CFSTI: HC \$1.00/MF \$0.50

Serial removal of the four liver lobes in rats that remain after partial hepatectomy, permitted study of the effects of radiation on somatic cells as a function of time following radiation. The most significant finding of the study is a decreasing percent of labeled cells with increasing doses of radiation. Almost all of the depression of DNA synthesis was found in liver specimens taken one hour after radiation. This is understandable since the labeled thymidine is only available for this

period of time. There was a parallel depression of the rate of DNA synthesis and the percent of the cells synthesizing DNA. The percent of labeled cells was reduced from 26 percent in the controls to 4.7 percent in the radiated animals. The most plausible explanation for the increasing reduction of the percent labeled cells with increasing doses of radiation is the reduction of the cells actively synthesizing DNA. Author (NSA)

N66-31796# Virginia Univ., Charlottesville. Radiobiology and Biophysics Lab.

THE DEPRESSION OF DNA SYNTHESIS, AND THE PERCENT OF CELLS SYNTHESIZING DNA IN RADIOSENSITIVE INTESTINAL CELLS AND RADIORESISTANT LIVER CELLS FOLLOWING RADIATION, PART II

W. B. Looney [1965] 12 p refs

(Contract AT(40-1)-2889)

(TID-21908) CFSTI: HC \$1.00/MF \$0.50

A close parallel relationship between the depression of the rate of DNA synthesis and the depression of percent labeled cells synthesizing DNA with increasing amounts of radiation, given at a constant dose rate of 300 R/min is shown. The curves for the depression of both the rate of DNA synthesis and percent labeled cells can be resolved into two components when plotted semilogarithmically. The calculated ^{37}D dose of 570 rads and 32,000 rads was greater than the ^{37}D dose of ≈ 100 rads for most mammalian cell lines. The inability of the cells to synthesize DNA was, therefore, taken as presumptive evidence of cell lethality. The characteristics of the curves for rates of depression of DNA synthesis in the radioresistant liver cells of rats and the radiosensitive intestinal cells are similar. The magnitude of the rate of depression is greater in most instances in the cells of the intestines as compared to the cells of the liver. This difference may be the result of differences in the kinetics of labeled thymidine incorporation into DNA in the two organs; however, these differences may be related to yet unrecognized changes in the two organs. Further studies may, therefore, lead to better understanding of differences in radiosensitivity in mammalian cells. If the assumption is made that cell lethality is related to radiation-induced genetic changes at the molecular and morphological levels, then a number of studies in both lower and higher organisms would support the concept that cell death could be mediated through the genetic material. Author (NSA)

N66-31798# Commissariat à l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

ACTION OF 50 R X-RAY DOSES ON THE REPRODUCTIVE FUNCTION OF C3H STRAIN MICE. EFFECT OF FRACTIONATION; ACTION OF REPEATED IRRADIATION ON SUCCESSIVE GENERATIONS [ACTION DE 50 R DE RAYONS X SUR LA FONCTION DE REPRODUCTION DES SOURIS DE RACE C3H. INFLUENCE DU FRACTIONNEMENT; ACTION DE LA REPETITION DES IRRADIATIONS AU COURS DES GENERATIONS SUCCESSIVES]

Denise Alix. Dec. 1965. 24 p refs. In FRENCH (CEA-R-2874)

The effects of X-radiation on reproduction of mice were studied. Animals were exposed to single doses of 20, 30, 40, and 50 R, and fractional doses of 50 R/total dose divided into 2, 5, 10, or 25 irradiations distributed over one month duration. The offspring were irradiated at the same doses as the parents, consanguinity being maintained. Statistical treatment of results was carried out. Results indicated that couples receiving a single exposure of 50 R or two exposures of 25 R at one month intervals gave comparable results. Fractional doses did not produce the slightest diminution of

X-ray effect. 30 R exposure brought about a decrease in fertility, with an increase in abortions. Fertility of 20 R irradiated couples remained below controls. After ten times 5 R and twenty-five times 2 R, the number of abortions was the largest. Ovarian function is particularly sensitive to X-rays, one may think that twenty-five 2 R doses give injuries conditioning non-viability of conception products, and smaller doses should produce mutations and yield births of altered genotype individuals. Author (NSA)

N66-31801# Laboratoires du Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).

ACUTE AND CHRONIC EFFECTS OF RADIATIONS CONSIDERED PRIMARILY FROM THE POINT OF VIEW OF NUCLEIC ACID AND PROTEIN METABOLISM [EFFETS AIGUS ET CHRONIQUES DES RADIATIONS ENVISAGEES SURTOUT AU POINT DE VUE DU METABOLISME DES ACIDES NUCLEIQUES ET DES PROTEINES] Final Report

17 Jan. 1966. 34 p refs. In FRENCH

(Contract EURATOM-053-64-3 BIOB)

(EUR-2769 f)

Progress is reported on studies on the early cytochemical and biochemical effects and on the genetic effects of ionizing radiations on plants and mammalian tissues and on their modifications by radioprotectors. Emphasis was placed on studies on the effects of X-radiation on the metabolism of nucleic acids and proteins and studies on the mechanisms of action of chemical radioprotectors; the increased effectiveness of mixtures of radioprotectors; the study of the influence of radioprotectors on cell metabolism; and studies on the influence on the permeability of the cell membrane to DNA and on the translocation of DNA in different organisms (mice and plants), by means of chromatographic studies with DEAE-cellulose paper, ultracentrifugational studies in CsCl gradients, and autoradiographic studies. A list is included of 73 publications that report the findings in detail. NSA

N66-31806*# National Aeronautics and Space Administration, Washington, D. C.

PROCEEDINGS OF THE EXPERIMENTERS' INFORMATION MEETING ON THE APOLLO APPLICATIONS PROGRAM IN BIOSCIENCE

Siegfried J. Gerathewohl and Donald R. Beem, ed. (Am. Inst. of Biol. Sci.) 1966. 137 p. Meeting held in Washington, D. C., 22-23 Nov. 1965

(NASA-TM-X-57742) CFSTI: HC \$3.00/MF \$1.00 CSCL 06C

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2. STATUS REPORT ON THE BIOSATELLITE D. Jenkins p 17-19 refs (See N66-31808 18-04)
3. REPORT ON APPROVED BIOSCIENCE EXPERIMENTS FOR APOLLO: EFFECTS OF WEIGHTLESSNESS ON ISOLATED HUMAN CELLS P. O'B. Montgomery, Jr. (Texas Univ.) p 21-30 refs (See N66-31809 18-04)
4. DISCUSSION AND INTERPRETATION OF THE CHANGES PROVOKED BY ZERO GRAVITY ON THE OTOLITH UNIT OF FROGS T. Gualtierotti p 31-48 refs (See N66-31810 18-04)
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6. PLANNING OF SCIENTIFIC AND TECHNICAL EXPERIMENT PAYLOADS FOR AAP T. A. George p 67-74 refs (See N66-31812 18-30)

7. SPACECRAFT INTERFACE IN APOLLO, INCLUDING APOLLO EXPERIMENTAL PALLET R. Clemence, Jr. p 75-91 refs (See N66-31813 18-31)

8. BIOSCIENCE EXPERIMENTS UNDER CONSIDERATION AND REVIEW FOR AES AND AAP S. J. Gerathewohl p 95-103 refs (See N66-31814 18-04)

9. ADVANCED BIOSCIENCE EXPERIMENTATION IN A ZERO-GRAVITY LABORATORY F. Crandall (Electro-Optical Systems) p 105-129 refs (See N66-31815 18-04)

N66-31807*# National Aeronautics and Space Administration, Washington, D.C.

STATUS REPORT ON BIOSCIENCE ON GEMINI

Siegfried J. Gerathewohl /In its Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 5-16 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

The various types of bioscience experiments that have been performed during the the Gemini-3 through Gemini-7 missions are reviewed, and their objectives and results are listed. Emphasis is placed on the following studies: (1) Weightlessness effects on the processes of fertilization, cell division, and development of sea urchin eggs; (2) prolonged weightlessness effects on cell tissues of frog eggs (this experiment is in the planning stage); (3) radiation and weightlessness effects on human white blood cells radiation dosage; (4) astronaut's visual performance during flight and visual acuity from orbital altitudes; and (5) a micrometeorite experiment to collect and study the nature of interplanetary dust. G.G.

N66-31808*# National Aeronautics and Space Administration, Washington, D. C.

STATUS REPORT ON THE BIOSATELLITE

Dale Jenkins /In its Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 17-19 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

The philosophy and rationale of the U.S. biological space program on Gemini are reviewed and compared to similar efforts in the U.S.S.R. Results of decreased gravity environment, radiation combined with weightlessness, and biorhythmic changes on plants and animals seem to indicate that vibration and acceleration during launch can cause biological effects, and require baseline exposure of all experiments before actual flights take place. The author states that only weightlessness, and not zero G effects, can be studied during space travel because either the Sun's or the Earth's gravity is always present; weightlessness is defined as a free fall caused by the velocity of the spacecraft traveling at a speed that equals the gravitational pull of the Earth. G.G.

N66-31809*# Texas Univ., Dallas. Southwestern Medical School.

REPORT ON APPROVED BIOSCIENCE EXPERIMENTS FOR APOLLO: EFFECTS OF WEIGHTLESSNESS ON ISOLATED HUMAN CELLS

P. O'B. Montgomery, Jr. /In NASA, Washington Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 21-30 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

Described is a biosatellite experimental unit able to take time-lapse motion picture photographs of the phase-control images of living human cells in a state of weightlessness for a period of 21 days. It contains time-lapse motion picture cameras with locked focuses, microscopes, chambers for holding cells, and media reservoirs which will automatically

feed the cells on a predetermined schedule. Electronics control the action of the feed mechanism, rotate the film, and are used to maintain the proper body temperature to keep the cells warm. A similar instrument package is also shown for manned satellite experiments that contains two microscopes of different magnification to be operated by the astronauts. G.G.

N66-31810*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

DISCUSSION AND INTERPRETATION OF THE CHANGES PROVOKED BY ZERO GRAVITY ON THE OTOLITH UNIT OF FROGS

T. Gualtierotti /In NASA, Washington Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 31-48 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

Otolithic units of living frogs were studied for their biorhythmic responses to centrifugal acceleration and to parabolic zero gravity flights. Microelectrodes, implanted into the animals' vestibular nerves, obtained their electrical response impulses which were then amplified and recorded. Results from 400 otolithic units indicated different response sensitivities for most units, and it was assumed that otoliths cover basically different ranges. Comparison of otolithic acceleration responses during level flights with those obtained during parabolic flights showed higher bioelectric responses for the same unit immediately after the parabolic tests. G.G.

N66-31814*# National Aeronautics and Space Administration, Washington, D. C.

BIOSCIENCE EXPERIMENTS UNDER CONSIDERATION AND REVIEW FOR AES AND AAP

Siegfried J. Gerathewohl /In its Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 95-103 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

A total of 76 bioscience experiments were reviewed for the Apollo Applications Program from areas of environmental biology, physiology, psychobiology, and exobiology. Experiments selected in environmental biology cover the genetic effects of weightlessness in such processes as fertilization, cell division, differentiation and metabolism, tissue and organ formation, and related functions. Physiological studies will investigate the dynamic processes in animal systems to supply the basis for an understanding of zero gravity phenomena in human systems. Exobiological investigations will be concerned with life migration in planetary system and the search for extraterrestrial life forms at orbital altitudes. G.G.

N66-31815*# Electro-Optical Systems, Inc., Pasadena, Calif. **ADVANCED BIOSCIENCE EXPERIMENTATION IN A ZERO-GRAVITY LABORATORY**

Frank Crandall /In NASA, Washington Proc. of the Experimenters' Inform. Meeting on the Apollo Appl. Program in Biosci. 1966 p 105-129 (See N66-31806 18-04) CFSTI: HC \$3.00/MF \$1.00

The concept of an advanced manned space bioscience laboratory was analyzed for its application to gravitational biology research. Potential bioscience experiments were screened for their scientific merit, their interest to the scientific community, and environmental requirements in regard to hardware and facilities. Areas that were selected for hypothetical experiments included biological transport phenomena, cell division and cytobiology. Experiments involving

groups of living things covered gravitational growth, mutation, activity, and morphology of *Protista*, the role of gravitational forces in animal embryological differentiation and early morphogenesis, and the mechanisms by which gravity plays a controlling part in tropic responses and morphogenesis of plants. G.G.

N66-31851*# National Aeronautics and Space Administration, Washington, D. C.

LIVING IN SPACE

[1966] 16 p

(NASA Facts, Vol. III, No. 5) GPO \$0.15 CSCL 06K

A brief non-scientific discussion is presented on the astronaut life support elements of pressure, temperature, oxygen, and water necessary for space travel. Other materials vital to life support are tabulated in pounds per day to illustrate their relation to equipment weight. An experimental working model of an orbiting space laboratory is described. The regeneration of oxygen and water are examined. Techniques for freeze-drying foods in vacuum packages are mentioned, and a sample menu is listed. Personal hygiene and waste management methods are considered, as well as the use of energy for thermal control and electricity. S.P.

N66-31873# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (West Germany). Institut für Flugmedizin. **THE REACTION OF PULSE RATE AND ETHER-DECHOLIN-TIME UNDER HIGH PRESSURE [DAS VERHALTEN DER PULSFREQUENZ UND DER AETHER-DECHOLINZEIT IM UEBERDRUCK]**

Ulrich Bels May 1966 64 p refs. In GERMAN, ENGLISH summary

(DLR-FB-66-36; DVL-510) CFSTI: HC \$2.50/MF \$0.75

This report is aimed at settling the question whether the bradycardia observed by several authors during exposure to high pressure is due to a pressure rise in the pulmonary circulation. The ether- and decholin-time was determined on male subjects under 2 to 4 atu. At the same time the heart rate was evaluated electrocardiographically. In subsequent high pressure experiments with albino rats, using gas mixtures with changing oxygen partial pressure, we tried to analyze the releasing factors for the development of bradycardia under high pressure conditions. Author

N66-31885# National Aerospace Lab., Tokyo (Japan)

A STUDY OF DIAL LEGIBILITY

Noriko Miyoshi, Masanori Okabe, and Sumiko Ishikawa 1966 19 p refs. In JAPANESE, ENGLISH summary

(NAL-TR-99) CFSTI: HC \$1.00/MF \$0.50

An experimental study was conducted on eye movement to determine its validity as an index of legibility. Movement, accuracy, and speed in dial reading are measured. The correlation between eye movement, accuracy, and speed suggests the possibility of eye movement as a good index for measuring legibility as well as accuracy and speed. Author

N66-31941*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

THE EFFECTS OF CONFINEMENT AS A FACTOR IN MANNED SPACE FLIGHT

T. M. Fraser Washington, NASA, Jul. 1966 184 p refs

(Contract NASr-115)

(NASA-CR-511) CFSTI: HC \$5.00/MF \$1.25 CSCL 06S

The nature of confinement is discussed in relation to isolation and sensory deprivation and the operational and experimental experience of confinement is tabulated in terms of conditions, subjects, available volume, and significant findings.

The psychological response is shown to be manifested in the form of subjective emotional reactions, discomfort and, rarely, perceptual aberration; performance decrement is relatively slight. The physiological response is seen to be one of non-specific reaction to stress accompanied by specific changes (e.g., cardiovascular deconditioning) attributable to the reduced mobility. Some adaptation seems to take place with continued confinement, but the adaptation breaks down after about 60 days. Tolerance to confinement is discussed and tolerance curves are presented indicating thresholds of acceptable and unacceptable tolerance and an intermediate zone. The curves indicate, for 30 to 60 days' confinement, about 150 cu ft of free volume per man are necessary. Tolerance is modified by habitability, work, rest, recreation, and exercise schedules. Weightlessness may improve the restrictive aspects and hence improve tolerance, but at the same time aggravate, for example, the cardiovascular decrement. Author

N66-31966# Joint Publications Research Service, Washington, D. C.

[ULTRASONICS AND INDUSTRIAL HYGIENE]

A. F. Shitskova, ed. 21 Jul 1966 46 p refs. Transl. into ENGLISH of five articles and foreword from the book "Voprosy Gigiyeny Truda i Profpatologii Pri Promyshlennom Primenenii Ul'trazvuka, Uchenyye Zapiski, No. 11 Moscow, Profizdat Publishing House, 1963

(JPRS-36613; TT-66-33044) CFSTI: \$2.00

Fundamental industrial health and safety problems relating to the technological use of ultrasonics are discussed, along with the biological and pathological effects on the human organism of ultrasonic vibrations. In addition, the responses of the central and peripheral nervous systems to the combined actions of ultrasonic waves and other high frequency noises are examined. Cochleovestibular disturbances during prolonged exposure to industrial ultrasonic radiation are also considered. D.T.

N66-31984# Federation of American Societies for Experimental Biology, Washington, D. C.

DIURNAL RHYTHM OF AUTONOMIC FUNCTIONS IN COSMIC FLIGHT

G. V. Altukhov, P. V. Vasil'ev, V. E. Belai, and A. D. Egorov [1965] 15 p refs. Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), v. 30, no. 2, 1965 p 182-187

Sponsored by Public Health Serv.

(TT-66-60412) CFSTI: HC \$1.00/MF \$0.50

Changes in the rate of cardiac contractions and in the systolic index in the course of the day are analyzed and considered as an indication of the state of the cardiovascular system and the body as a whole. The data are based on observations made on four Soviet cosmonauts during preflight and orbital flight periods. Diurnal changes in the pulse rate and the systolic index were evaluated by mathematical analysis of corresponding observations under identical circumstances. Changes in the diurnal rhythm of certain autonomic functions were observed during periods of prolonged weightlessness. The mechanism responsible for these changes is thought to be connected with weightlessness specifically and with nervous and emotional tension. K.W.

N66-32105# Defence Research Board, Ottawa (Ontario).

QUANTITATIVE DISTRIBUTION AND SEASONAL DYNAMICS OF ZOOPLANKTON IN THE NEWFOUNDLAND AREA

Ye. V. Vladimirskaia Apr. 1966 9 p refs Transl. into ENG-LISH from Okeanol. Issled., Sb. Statei (Moscow), no. 13, 1965 p 137-142

(T-452-R; AD-632739) CFSTI: HC \$1.00/MF \$0.50

The material for the present communication was supplied by the Plankton collections made during the IGY by the research ship Mikhail Lomonosov (2nd, 4th, 7th and 11th voyages) and by the expeditionary vessel Sevastopol (14th voyage). The Plankton was collected with a small Juday net made of 38 silk gauze, at standard horizons from depths 500 or 1000 m to the surface. The quantitative analysis of the Zooplankton was carried out by a method developed in VNIRO (all-union scientific institute for marine fishing and oceanography.) (TAB)

N66-32117*# Hollins Coll., Va.

THE RAT'S ANTICIPATION OF DIURNAL AND A-DIURNAL FEEDING

Robert C. Bolles and Louis W. Stojkiewicz [1963] 11 p refs Submitted for Publication

(Grant NSG-396)

(NASA-CR-60224) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

Ss were trained to press a bar for food and then confined for 21 days to boxes where they could press at any time but where food was obtained only at regularly scheduled feeding times. Different groups were scheduled to eat on diurnal, i.e., 24-hr., cycles or on a-diurnal, 19 or 29 hr., cycles. The a-diurnal Ss were also born, reared and tested under 19 or 29 hr. environmental conditions to provide further stimulus support for the anticipation of feeding. Nonetheless, they failed to show any genuine temporal discrimination or anticipation of feeding. The fact that the diurnal Ss showed a large, clear anticipation effect indicates that when such an effect occurs it is governed by some sort of 24-hr. biological clock rather than being based upon deprivation-produced stimuli. Author

N66-32122*# California Univ., Berkeley. Space Sciences Lab. ENZYME ACTIVITY IN TERRESTRIAL SOIL IN RELATION TO EXPLORATION OF THE MARTIAN SURFACE Fourth Semiannual Progress Report, 1 Jan.-30 Jun. 1966

J. J. Skujins and A. D. McLaren 12 Jul. 1966 81 p refs /ts Ser. No. 7, Issue No. 26

(Grant NSG-704)

(NASA-CR-76549) CFSTI: HC \$2.50/MF \$0.75 CSCL 06M

Qualitative and quantitative tests were made for various enzyme activities in terrestrial soil for the purpose of adapting these procedures to investigations of Mars surface. Enzyme environments at interfaces and in Martian-like environments of limited water availability are being investigated. Analysis of phosphatase activity in native soils, and soils sterilized by irradiation revealed that no correlation was found between the seasonal variation in microbial numbers and phosphatase activity; however, both number and activity increased in samples of sterile, irradiated soil inoculated with native soil. Studies were initiated to elucidate the biochemical pathway of n-dodecane utilization by soil organisms. Instrumentation for the semiconductor solid state, C-14 carbon dioxide detector was developed for possible use with urea as a substrate for the detection of its catalytic (enzymatic) breakdown in a Martian environment. R.L.I.

N66-32127# Agricultural Research Service, Ithaca, N. Y. Northeast Branch.

DIFFUSIVE RESISTANCES AT, AND TRANSPIRATION RATES FROM LEAVES IN SITU WITHIN THE VEGETABLE CANOPY OF A CORN CROP Research Report No. 388

I. I. Impens, D. W. Stewart, L. H. Allen, Jr., and Edgar R. Lemon Jun. 1966 29 p refs Prepared in cooperation with Cornell Univ. /ts Interim Rept.-66-1 (RR-386)

Height distributions of internal leaf diffusion resistance (r_i) and external boundary layer diffusion resistance (r_a) were evaluated in a corn crop. Both r_a and r_i increased with depth and r_a was about 10% of r_i or less. Profiles of latent heat flux density and source intensity in the crop showed that transpiration closely paralleled foliage distribution but not radiation absorption. Author

N66-32135*# St. Johns Univ., Jamaica, N. Y. Dept. of Biology.

AN INVESTIGATION OF A SONO-CHEMICAL APPROACH IN STERILIZATION PROBLEMS Fourth Semiannual Progress Report, 1 Jan.-30 Jun. 1966

Michael A. Pisano [1966] 13 p

(Grant NSG-684)

(NASA-CR-76618) CFSTI: HC \$1.00/MF \$0.50 CSCL 06T

The effects of airborne ultrasonic irradiation, used in combination with propylene oxide, on spores of *B. subtilis* var. *niger* were studied in an effort to achieve sterilization. It was found that the use of ultrasound alone significantly reduces viable counts of the spore, and that the closer the specimen to the sound source, the greater will be the bacteria kill. Factors to be considered in achieving total sterilization are: the concentration of propylene oxide employed, the period of exposure, and the irradiation distance when ultrasound is added. It was demonstrated that the combination of propylene oxide and ultrasound results in more effective kill than when either agent is used alone. R.L.I.

N66-32141*# Texas Univ., Austin. Defense Research Lab.

[STUDIES OF AUDITORY INFORMATION PROCESSING EMPHASIZING THE APPLICATION OF SIGNAL DETECTABILITY THEORY TO THE AUDITORY SENSORY RESPONSES] Semiannual Report, 1 Dec. 1965-31 May 1966 and Eighth Quarterly Status Report, 1 Mar.-31 May 1966

L. A. Jeffress 27 Jun. 1966 10 p

(NASA Order R-129; Contract Nonr-3579(04))

(NASA-CR-76560) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

Research progress is reviewed on several studies pertaining to auditory information processing, adaptation to brightness of flashed incremental and decremental stimuli, and effects of chromatic adaptation on color naming. Experiments conducted on listener's free response to auditory signal detection, human performance and response were measured by randomly spacing 10 signals of low detectability, 150 msec in duration, 500 Hz, within each five-minute listening period; 10 noise-alone intervals were also defined in each period. Distributions of these response latencies were separately constructed for signal-plus-noise intervals. In other experiments on signal detection versus duration for an electric ear model, a fixed-bandwidth filter was used in combination with changing time constants of the detector. The filter was followed by a linear (half-wave) detector and by an integrator with a decay time of 100 msec. A similar experiment employing a square-law rectifier (energy detector), and the same integration time constants, was somewhat more successful. R.L.I.

N66-32145*# Taft (Robert A.) Sanitary Engineering Center, Cincinnati, Ohio.

ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Fifth Quarterly Progress Report, Apr. 1-Jun. 30, 1966

N66-32155

Robert Angelotti Jul. 1966 22 p refs

(NASA Order R-36-015-001)

(NASA-CR-76539) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

D values for dry heat exposure temperatures of 115°C and 135°C were determined for *Bacillus globigii* spores encapsulated in plastic and dried on paper strips. These values are: plastic 115°C, D=15.4 hours; 135°C, D=1.4 hours; paper 135°C, D=16.1 minutes. The slope of the Decimal Reduction Time curve for spores encapsulated in Lucite and obtained by plotting the logarithms of D for 115, 125, and 135°C against temperature was calculated to be 18.5°C (33.3°F).

Author

N66-32155# Aerospace Medical Div. Aeromedical Research Lab (6571st), Holloman AFB, N. Mex.

FLUID AND SOLUTE SHIFTS ACROSS THE PERITONEAL MEMBRANE

Donald C Van Riper Mar. 1966 30 p refs

(ARL-TR-66-9; AD-632853) CFSTI: HC \$2.00/MF \$0.50

Isosmotic solutions of mannitol were injected into the peritoneal cavities of 15 dogs. The volume of remaining fluid was measured at timed intervals after injection. The concentration of electrolytes quickly approached plasma levels, principal fluxes occurring during the first 2 hours. Changes in concentration reflected movement of water from the plasma into the intraperitoneal fluid which increased terminally to an average of 26.8 percent of injected volume. The osmolality of the peritoneal fluid terminally was higher than that of the plasma in all but three of the dogs. A computer method is presented for calculating the rate constants for fluxes of solutes in and out of the peritoneal cavity.

Author (TAB)

N66-32166*# National Aeronautics and Space Administration, Washington, D. C.

REPORT ISSUED ON GEMINI 8 EXPERIMENTS

23 Jun. 1966 21 p

(NASA News Release-66-163) CSCL 06S

This report describes the objectives, equipment, procedures, and results of the 10 scientific, medical, and technological experiments carried on the Gemini 8 mission. Because of the short duration of the mission, data were received from only three of the experiments, and a fourth, still on the Agena target vehicle, is scheduled for later recovery. The experiments which provided data include bioassays of flight crew body fluids, frog egg growth, and a nuclear emulsion experiment. In the first experiment, two post-flight blood samples were received from each flight crew member. An inflight urine sample was collected from the command pilot, and samples taken from the crewmen after the flight. Data from the frog egg experiment indicates that when the gravitational force is near zero, fertilized frog eggs divide normally. Telemetry indicated that the nuclear emulsion experiment was working satisfactorily and had completed about 17% of its steps when the flight terminated. The experiment was not recovered from the spacecraft retrograde adapter section.

R.N.A.

N66-32173# Texas Christian Univ., Fort Worth, Inst. of Behavioral Research

RESEARCH PROGRAMS AND SPECIAL SERVICES, 1963-1964

[1964] 19 p refs

This report outlines the research programs and special services of Texas Christian University's Institute of Behavioral Research. The Institute's organization and objectives are described. Staff members and faculty associates are listed, areas

covered by the research programs are defined, current and recently completed projects are listed, criteria for the selection of research projects are discussed, past and planned seminars and symposia are mentioned, and a list of publications is presented.

R.N.A.

N66-32179# Joint Publications Research Service, Washington, D. C.

ELECTRIC SLEEP THERAPY OF HYPERTENSION

G V Sergeyev 30 Jun. 1966 59 p Transl into ENGLISH of selected portions of the book "Lecheniye Elektrosnom Bol'nykh Gipertonicheskoy Bolezn'yu" Moscow, 1965 (JPRS-36279; TT-66-32712) CFSTI: \$3.00

CONTENTS

1. ELECTRONARCOSIS AND SLEEP PRODUCED BY PASSING AN ELECTRIC CURRENT THROUGH THE BRAIN p 6-16 ref

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3. APPARATUSES USED IN SLEEP THERAPY AND METHODS USED IN PRODUCING IT p 29-38

4. MECHANISM OF THE ACTION OF SLEEP PRODUCED BY PASSING AN ELECTRIC CURRENT THROUGH THE BRAIN p 39-50

N66-32187*# National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Tex.

EVALUATION AND COMPARISON OF THREE SPACE SUIT ASSEMBLIES

R L Jones Washington, NASA, Jul. 1966 142 p

(NASA-TN-D-3482) CFSTI: HC \$4.00/MF \$1.00 CSCL 06K

This report describes in detail the program by which the Manned Spacecraft Center evaluate the performance of space suits. The testing quantifies various aspects of suit design, function, operation, and man-suit-system interface. The technique evaluates the suits with a basic rationale emphasizing mission requirements, and the procedures are structured in such a manner as to maximize objectivity. Test results are presented on the evaluation of three different space suits. These results indicate the relative position of each suit in each test and the differences between suits. By a collation of these data, the various interested but not specialized technical personnel can obtain data which reveal the state of technology of space suit design and development. These data can be used by engineers in vehicle design to determine the impact on detail design of the space-suited operator.

Author

N66-32201# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska

AN/URT-21 LOCATOR BEACON JUMP TEST AND RECEPTION DISTANCES

John R. Schumann and Walter W. Millard Jan. 1966 24 p (AAL-TR-65-23; AD-630190) CFSTI: HC \$2.60/MF \$0.50

The AN/URT-21 Locator Beacon and riser antenna were installed in several different locations in the B-5 Back Style and AP28S-10 parachutes. Live and dummy drop tests were conducted at altitudes of 1500 to 5000 feet in temperatures of -5°F to 29°F. Monitoring stations at a distance of 2 to 28 miles from the drop zones reported signals heard from time of parachute deployment until ground contact was made. Aircrew members wore the back style parachute with the beacon installed between the pack tray and back cushion. A study of their subjective evaluation of the comfort of this parachute was conducted in F-102, B-47 and KC-135 aircraft.

After simulating ejection procedures and flying duties, aircrew members reported very minor or no discomfort and no interference with flying duties. It is recommended that beacons be installed between the pack tray and back pad, that the beacon activating button be made of rubberized material, and that the activating cord be tied on the riser.

Author (TAB)

N66-32208# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

PROBLEMS IN AERIAL APPLICATION: A COMPARISON OF THE EFFECTS OF DIELDRIN POISONING IN COLD-ADAPTED AND ROOM-TEMPERATURE MAMMALS

George Clark Apr. 1966 13 p refs
(AM-66-5)

The effects of dieldrin poisoning on the liver were compared in cold-adapted rats and normal rats. One-fourth of the cold-adapted rats succumbed to the poisoning while all of the normal rats survived. There were minimal fat deposits in both groups, but the cold-adapted rats were least affected. By contrast, cytoplasmic RNA was altered to a greater extent in the cold-adapted rats, although with both the changes were located periporally. Another stain that is probably specific for secondary amines was increased in both treated groups but was decreased in cold adaptation.

Author

N66-32260*# Massachusetts Inst. of Tech., Cambridge, Man-Vehicle Control Lab.

STUDIES OF HUMAN DYNAMIC SPACE ORIENTATION USING TECHNIQUES OF CONTROL THEORY Status Report

L. R. Young and Y. T. Li Jun. 1966 31 p refs
(Grant NSG-577)

(NASA-CR-76709; MV-66-1) CFSTI: HC \$2.00/MF \$0.50 CSCL 05H

This report describes research activity on the application of control theory techniques to analytical and experimental investigations of situations requiring a human operator to maintain himself or a vehicle in a desired orientation in space. The research includes engineering descriptions of the basic biological subsystems, development of general models for the human operator as an element in the control system of multiple-loop time varying vehicle orientation systems, and application of these models to selected vehicle control problems. The investigations emphasize the dynamic orientation aspects of manual control and in particular the effects of vehicle motion as sensed by the vestibular system.

R.N.A.

N66-32262*# Naval Submarine Medical Center, Groton, Conn.
STUDIES OF CIRCADIAN CYCLES IN HUMAN SUBJECTS DURING PROLONGED ISOLATION IN A CONSTANT ENVIRONMENT USING 8-CHANNEL TELEMETRY SYSTEMS
Memorandum Report No. 66-4

Bruce R. Clegg and Karl E. Schaefer 10 Feb. 1966 13 p refs
(NASA Order R-24)

(NASA-CR-76704) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

The report presents experiences obtained with the use of 8-channel telemetry systems in continuous simultaneous monitoring of six physiological functions (EEG, EKD, respiratory rate, body temperature, skin temperature, BSR) in one of two subjects during isolation experiments of two or three weeks duration. The studies were performed to determine the extent of internal desynchronization in free running circadian cycles of physiological functions, under conditions of confinement in a constant environment such as those encountered in spaceflights and underwater exploration.

TAB

N66-32265*# Harvard Univ., Boston, Mass. Thorndike Memorial Lab.

A STUDY OF PHYSIOLOGICAL MECHANISMS AND INTERRELATIONS BETWEEN SYSTEMIC AND REGIONAL BLOOD VOLUME, BLOOD FLOW AND ELECTROLYTE BALANCE
Interim Progress Report

Walter H. Abelmann and Laurence E. Earley 30 Jun. 1966 10 p refs
(Grant NSG-595)

(NASA-CR-76667) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P

Studies on the role of hemodynamics in the regulation of sodium excretion and extracellular volume were continued. Studies have shown that probably a transmission of perfusion pressure through the renal circulation is important in determining sodium reabsorption. Additional studies are being conducted on the role of renal hemodynamics in limiting sodium excretion in animals with sodium retention and the mechanisms whereby these hemodynamic factors alter the tubular reabsorption of sodium. Studies of the role of atrial size and function in regulating sodium excretion were continued. Studies were begun in patients with arteriosclerotic heart disease and atrial fibrillation, primary myocardial disease and atrial fibrillation, and idiopathic atrial fibrillation. So far, cardioversion has tended to improve sodium excretion in these patients. Some results are reported on the effect of abnormal circulatory states on the circulatory response to upright tilt. As part of an inquiry into the effects of acute changes in plasma volume on systemic hemodynamics, the hemodynamic effects of ethacrynic acid in normal subjects and in patients with congestive heart failure are being studied.

R.N.A.

N66-32296*# Miami Univ., Coral Gables, Fla. Research and Teaching Center of Toxicology.

REPORT OF TOXIC EFFECTS OF FLUORINE FOLLOWING SHORT-TERM INHALATION

M. L. Keplinger 31 May 1966 82 p
(Grant NGR-10-007-012)

(NASA-CR-76741) CFSTI: HC \$2.50/MF \$0.75 CSCL 06T

Exposure of experimental animals to fluorine for 1 hr and less is reported in detail. The design and construction of special equipment, including a chamber for exposure, is described, and analytical methods developed for the determination of the concentration of fluorine in air are presented. Signs of intoxication from high concentrations of fluorine in air were marked irritation of the mucous membranes of the eyes and respiratory tract and some skin irritation. At lower concentrations, there were fewer signs of intoxication: dyspnea, lethargy, red nose, and swollen eyes were observed. At even lower concentrations there were no gross signs of intoxication, and complete blood counts on these animals did not show significant changes due to fluorine. Gross pathology following high exposure was congestion, hemorrhage, and atelectasis in the lungs and some congestion and/or mottling in the liver. Following sublethal exposures, there was pathology in the lungs, liver, and kidneys. Exposure to concentrations at or below 100 ppm for 5 min, 70 ppm for 15 min, 55 ppm for 30 min, or 45 ppm for 60 min caused no apparent effects in the animals.

L.E.W.

N66-32309# California Univ., Los Angeles. Dept. of Engineering.

STUDIES IN SKILLED MYOELECTRIC CONTROL **Final Report, 1 Dec. 1964-30 Nov. 1965**

John Lyman, Gershon Weltman, and Hilde Groth Apr. 1966
110 p refs /ts Rept.-66-25
(Contract AF 33(616)-1969)
(AFAL-TR-66-83; AD-633-010) CFSTI: HC \$4.00/MF \$0.75

Myoelectric (EMG) signal spectra were investigated and defined for a variety of conditions including different conditions of effort and fatigue. Cardioelectric (ECG) elimination techniques were investigated. Two experiments with uni-dimensional, graduated myoelectric control simulations were conducted to determine design parameters and human response characteristics. Multi-dimensional myoelectric control experiments were designed on the basis of the results of initial studies. An ancillary study on multi-dimensional control using an electromechanical manipulator was also undertaken. The obtained results indicate that the problem of EMG control is by no means solved. Author (TAB)

**N66-32335*# Douglas Aircraft Co., Inc., Long Beach, Calif
EXPERIMENTAL STUDY OF ACOUSTIC DISPLAYS OF
FLIGHT PARAMETERS IN A SIMULATED AEROSPACE
VEHICLE**

Darryl Katz, Jerry A. Emery, Richard F. Gabriel, and Alan A. Burrows Washington, NASA, Jul. 1966 162 p refs
(Contract NAS4-664)
(NASA-CR-509) CFSTI: HC \$5.00/MF \$1.00 CSCL 05H

This research was conducted to evaluate the feasibility of using acoustic stimuli in presenting information to humans. In particular, applications of acoustic displays of target location in target detection and of flight parameters in aerospace vehicles were examined. A simulated target detection task was devised and provisions made to display the lateral location of simulated targets acoustically using an interrupted 500 cycle/sec tone emanating from the target direction. The same information could be displayed visually on a meter or simultaneously by both acoustic and visual displays. Subjects engaged in the target detection task, requiring target location and identification, were concurrently involved in a visual tracking task. A secondary acoustic task was superimposed during some trials. In general, performance under acoustic display conditions was as good or better than performance under the conventional visual display condition. There were some indications of the superiority of the command visual display. There were no consistent indications of advantages related to augmentation of the acoustic displays. R N A.

**N66-32401# Joint Publications Research Service, Washington, D. C.
PROGRAMMED LEARNING. PROGRAMMED TEXTBOOKS.
TEACHING MACHINES**

A V Prokof'ev 19 May 1966 146 p refs Transl into ENGLISH of the book "Programmirovannoye Obucheniye. Programmirovannyye Uchbniki Machiny Dlya Obucheniya" Moscow, Military Publ. House of the Ministry of Defense USSR, 1965 p 3-162
(JPRS-35612, TT-66-32047) CFSTI: \$4.00

A thorough discussion is presented on the increasing use of programmed learning, programmed textbooks, and teaching machines in the Soviet Union. The document discusses programmed learning as a means of perfecting the learning process, the processing of educational material for programmed textbooks, programmed textbooks and teaching aids, preparing study material for use in teaching machines, the classification and descriptions of teaching machines, the description of an automated class and its teaching complex, and the experience acquired in the use of teaching machines and programmed textbooks. R N A.

**N66-32407# Ministry of Labour, Belfast (Ireland).
CODE OF PRACTICE FOR THE PROTECTION OF PERSONS
EXPOSED TO IONISING RADIATIONS IN RESEARCH
AND TEACHING**
London, HMSO, 1964 77 p refs
HMSO: 4s 6d

A safety code is given which applies to all research laboratories, research establishments and teaching laboratories in which ionizing radiations are used or radioactive substances are present. The provisions of the code relate to hazards arising from (1) any radioactive substances, whether sealed or unsealed and (2) any machines or apparatus which emit ionizing radiations, including apparatus in which charged particles are accelerated by a voltage of not less than five kilovolts. Major topics covered include administrative organization, precautions of general application, control of effectiveness of protective measures, medical supervision, special precautions of X-ray installations, sealed sources, unsealed radioactive substances, and nuclear reactors and criticality experiments; emergency procedures; and storage of sealed sources of ionizing radiations and unsealed radioactive substances. C T C.

**N66-32408# National Defense Research Organization T. N. O.,
The Hague (Netherlands).**

**PREVENTION OF THE BONE MARROW SYNDROME IN
IRRADIATED MICE. A COMPARISON OF THE RESULTS
AFTER BONE MARROW SHIELDING AND BONE MARROW
INOCULATION**

F. A. J. de Vries and O. Vos Apr. 1966 19 p refs
(MBL-1966-3; TDCK-45628) CFSTI: HC \$1.00/MF \$0.50

Shielding of bone marrow in irradiated mice was compared with intravenous injection of a bone marrow cell suspension in its effectiveness to prevent a bone marrow syndrome. Three criteria were used to measure this effectiveness: (a) survival of the irradiated mouse at 30 days after irradiation; (b) repopulation of irradiated haematopoietic tissues; and (c) incidence of spleen colonies. On the basis of the number of cells involved bone marrow injection appeared to be at least 100 times more effective than bone marrow shielding. Author

**N66-32441*# Naval Medical Research Inst., Bethesda, Md.
[EXPERIMENTAL INVESTIGATION OF THE MECHANISM
BY WHICH FREEZING OR DRYING AND ASSOCIATED
EFFECTS AFFECT LIVING CELLS]**

Harold T. Meryman 14 Jun. 1966 2 p
(NASA Order R-63)
(NASA-CR-76771; NMRI-022-jo) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

This letter briefly describes some of the results of a study on the freezing and drying of living cells. A continuously recording calorimetric apparatus was designed and constructed which enabled a demonstration of a consistent relationship between dehydration and freezing injury and ruled out previous theories regarding the mechanical effects of ice crystals. A hypothesis was assembled for the mechanism of freezing injury and its prevention by cryoprotective agents, which explains the effect of various freezing rates and cryoprotective agents on the basis of their effects on cell dehydration. The hypothesis led to experiments which demonstrated that freezing injury seen with low concentrations of cryoprotective agents can be prevented by very slow freezing and thawing. Supercooling studies showed that temperatures of -10°C can be easily achieved and indefinitely maintained using a variety of solutes which are not toxic and, in many cases, do

not penetrate the cell. These two preservation techniques are being applied to leukocytes, platelets, and certain protozoa.

R.N.A.

N66-32450# Atomic Energy Commission, Idaho Falls, Idaho. Health and Safety Div.

AIRBORNE PARTICLE SIZE ANALYSIS A Composite Bibliography

J. T. Collins, Jr., W. J. Harrie, D. D. Stromberg, and J. L. Powers
May 1966 37 p refs

(IDO-12051) CFSTI: HC \$2.00/MF \$0.50

References (325) are given to reports and journals published from approximately 1841 through 1965. The topics considered include: aerosol behavior and characteristics; aerosol generation; autoradiography; determination of particle size; and instrumentation for collection and separation.

NSA

N66-32462# California Univ., Livermore. Lawrence Radiation Lab.

DEPOSITION VELOCITIES OF AEROSOLS AND VAPORS ON PASTURE GRASS

H. Leonard Fisher 14 Mar. 1966 19 p refs

(Contract W-7405-ENG-48)

(UCRL-14702) CFSTI: HC \$1.00/MF \$0.50

Predictive models of vapor and aerosol particle deposition velocities on grass surfaces are presented both as equations and as parametric curves that illustrate the relationship between the deposition velocity and such factors as wind speed, terrain roughness, and the terminal velocity of particles. Comparison is made with experimental results under known conditions and it is demonstrated that vapor deposition velocity can be predicted to within a factor of 3, while particle deposition velocity can be predicted to a factor of 2 or better, the accuracy increasing with increasing particle size. The deposition velocity of fallout debris was calculated both for deposition on pasture grass and fallout collectors (pot or gummed-film) at wind speeds on the order of 10 mph. These calculations indicate that the deposition velocity on pasture grass for vapors and small particles is approximately three times as great as the deposition velocity on the fallout collectors. For particles 20 microns in diameter, the calculated values are the same for both types of surfaces.

Author (NSA)

N66-32464# California Univ., Berkeley. Lawrence Radiation Lab.

QUANTUM CONVERSION IN PHOTOSYNTHESIS: ELECTRON PARAMAGNETIC RESONANCE INVESTIGATIONS

R. H. Ruby Jan. 1966 61 p refs

(Contract W-7405-ENG-48)

(UCRL-16492) CFSTI: HC \$3.00/MF \$0.75

A review is presented on the use of electron paramagnetic resonance (EPR) in understanding the energy conversion mechanism in photosynthesis. Experiments were also performed that reflect the belief that there exists a common physical-chemical description of all biological photosynthetic systems by the choice of a single system, a purple bacterium. Reference information on biological materials is presented with reference to variables affecting the EPR signal size in the following sequence: changes in chemical environment-mutants, poisons, removal of pigments, organic oxidants and reductants, and redox potential; temperature; light dependence of the EPR signal-intensity dependence, spectral response, transient response, and quantum yield. Information on signal parameters such as shape, g-value, and spin-lattice relaxation time is also presented. It was concluded that there has been little success towards identifying specifically the physical entity that produces the EPR signal.

NSA

N66-32493# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

LITERATURE INDEX OF AEROSPACE MEDICINE AND BIOASTRONAUTICS, PUBLISHED IN USSR (1964-1965)

L. I. Boreva and E. M. Zabodovskaya 18 Mar. 1966 68 p refs
Transl. into ENGLISH of the publ. "Ukazatel Literatury po Aviakosmicheskoy Meditsine i Bioastronavtike, Izdannoy v SSSR (1964-1965)" Moscow, 1965

(FTD-TT-65-1661/1+4; AD-633355) CFSTI: HC \$3.00/MF \$0.75

A bibliography is presented of literature dealing with aerospace medicine and bioastronautics published in the Soviet Union during 1964 and 1965. Entries are presented alphabetically by author, and separately for each year, under the following headings: general aspects; biology; neuro and sensory physiology; psychology and psychiatry; biological, physiological, and psychological effects of environment factors and stresses; personnel; medical problems and pharmacology; toxicology; and man-machine integration and lift support systems. In addition to authors, only titles and sources are presented for the references.

M.W.R.

N66-32494# Harvard Univ., Boston, Mass. Dept. of Anatomy. **CELL PROLIFERATION KINETICS IN THE TONGUE AND INTESTINAL EPITHELIA OF HIBERNATING DORMICE (GLIS GLIS) Interim Report, 5 Jan.-1 Oct. 1965**

S. J. Adelstein, C. P. Lyman, and Regina C. O'Brien Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Apr. 1966 22 p refs
(Contract AF 41(609)-2296; Grants PHS-AM-94219; PHS-GM-05611)

(AAL-TR-65-16; AD-633344) CFSTI: HC \$1.00/MF \$0.50

The investigation attempts to define the state of cellular division in epithelial populations of the hibernating dormouse Glis Glis and to describe the dynamics of the cells, response to arousal. It was found that during hibernation DNA synthesis occurs at a markedly reduced rate, but the number of epithelial cells synthesizing DNA is the same in both hibernating and active animals. Labeled mitotic figures are not seen for up to 96 hours of continuous hibernation after tritiated thymidine is administered, suggesting there is a block in G₂. In hibernation the mitotic index drops and no anaphases or telophases are seen, suggesting presence of an intermitotic block. When animals are aroused, there is a flourishing of mitoses with appearance of anaphases, telophases and labeled mitotic figures indicating that both blocks have been relieved with a partial synchronization of proliferating cells.

Author (TAB)

N66-32508# Berkeley Inst. of Psychological Research, San Francisco, Calif.

BEHAVIORAL RESEARCH DURING THE 1963 AMERICAN MOUNT EVEREST EXPEDITION

James T. Lester, Jr. Jul. 1965 40 p refs

(Contract Nonr-4672(00))

(TR-2; AD-619531) CFSTI: HC \$2.00/MF \$0.50

The report summarizes a second aspect of the behavioral research done on the 1963 American Mt. Everest Expedition, viz., a testing of hypotheses proposed by Theodore Newcomb concerning the processes through which emerge a set of stable relationships among a group of initial strangers. It also reports the results of relating predicted compatibility (predictions based on test results from the Fundamental Interpersonal Relations Orientation inventory) to self-rated compatibility. On the whole the Newcomb hypotheses were supported. Results regarding compatibility were negative.

Author (TAB)

N66-32519# Indiana Univ., Indianapolis. Dept. of Neurology.
OXYGEN CONVULSIONS IN MAN
H. W. Gillen 1966 14 p refs Submitted for Publication
(Contracts Nonr-964(04); Nonr-4343(00))
(AD-631925) CFSTI: HC \$1.00/MF \$0.50

Seventy examples of acute cerebral oxygen toxicity were described. Twenty-five had convulsions as the first clinical manifestation of the toxicity. Ten had focal twitching, and thirteen more progressed to convulsions in spite of attempted immediate therapy. The convulsions were self-limited if the PO_2 was reduced to non-toxic pressures. The morbidity was minimal with retrograde amnesia as the only deficit that persisted beyond 24 hours. No deaths occurred in this series. Re-examination of the clinical data revealed only one instance where more careful pre-exposure selection may have prevented the convulsion. All exposures were at less than three atmospheres absolute, and all but four were for thirty minutes or less
Author (TAB)

N66-32520# Lyon Univ. (France). Lab. of Experimental Pathology.
SUPPRESSION OF DIFFERENT SLEEP STATES [LA SUPPRESSION DES DIFFERENTS ETATS DE SOMMEIL]
Pierre Vimont-Vicary 1965 99 p refs In FRENCH
(Grant AF-EOAR-62-67)

(AFOSR-66-0867; AD-632874) CFSTI: HC \$3.00/MF \$0.75
Cats with chronically implanted electrodes were selectively deprived of paradoxical sleep for 1-26 days by the swimming pool and electric shock techniques. The need for paradoxical sleep was demonstrated by the progressive diminution of the intervals between attempts to enter this phase. Deprivation of this phase of sleep for more than a week produced somnolence, muscular hypotony, sexual excitement, tachycardia, and a picture resembling hallucinations. At the end of this deprivation there was a selective paradoxical sleep 'rebound,' and up to 60% of the first 6 hours was spent in this phase of sleep. Substances with an inhibitory effect on paradoxical sleep, such as atropine, monoamine oxidase inhibitors, and reserpine, were studied, and the results are discussed in light of a neurohumoral hypothesis of sleep.
Author (TAB)

N66-32535# Marine Engineering Lab., Annapolis, Md.
EVALUATION OF FUNCTIONAL PERFORMANCE OF AN INTEGRATED SHIP CONTROL CONNING CONSOLE BY OPERATOR PERSONNEL
J. T. Mc Lane, W. J. Weingartner, and J. C. Townsend May 1966 54 p refs
(MEL-333/65; AD-482211)

The adequacy of the human engineering for a ship control conning console static mock-up was evaluated by six naval officers and three enlisted personnel. The console was designed for two operators—conning officer and conning assistant. Each officer was instructed to simulate three maneuvers: man-overboard, replenishment at sea, and maneuvering in restricted waters. He criticized the adequacy of the mock-up in light of the criteria established by the human engineering team by pointing out omissions, overinclusions, faulty layout, and desired substitutions. Two members of the team observed and took notes. The enlisted personnel were also questioned as to their evaluative comments at the conning assistant's position. Comments of both officers and enlisted men were analyzed and a list of recommendations was made. The subjects approved the ship control console concept and were in favor of its automatic features as long as a human override was available. Seating the conning officer and assigning both helm and throttle to the conning assistant alone were disapproved. The results of this experiment, combined

with continuing system development efforts, will be used as a basis for refining the conning console design. A prototype operational configuration will be constructed and tested in a simulated environment.
Author

N66-32561# European Atomic Energy Community, Brussels (Belgium).
INFLUENCE OF CERTAIN FACTORS ON THE NUMBER OF LEUCOCYTES IN THE BLOOD [INFLUENCE DE CERTAINS FACTEURS SUR LE NOMBRE DE LEUCOCYTES DANS LE SANG]
H. Tanguy Jun. 1966 16 p refs In FRENCH, ENGLISH summary
(EUR-2711-f) CFSTI: HC \$1.00/MF \$0.50

During the course of 3,518 haematological examinations at the Nuclear Research Center at Ispra, the influence of a certain number of factors on the number of leukocytes in the blood of 706 individuals was studied. The average number of leukocytes per cubic millimeter was found to be 8,218, with slight variations according to the year; there was a relatively important diminution in 1964. The individual variations are worth noting (4.4% of the cases have an average lower than 6,000; 8.5% an average higher than 10,000); but sex has no influence on the number. This average number of leukocytes varies also according to the season for no apparent reason, with a strong rise in September, October and December. Emotions have only a slight influence, and if so, cause a rise in the number of leukocytes. Race and origin play a more important role; the Italians have a notably higher average in relation to the Germans, Belgians, French and Dutch. Individuals who received low doses of ionizing radiations were compared with those who had not been exposed to radiations, and no difference in the number of leukocytes was found.
Author

N66-32567# Naval Personnel Research Activity, San Diego, Calif.
PITCH MEMORY FOR NEAR THRESHOLD STIMULUS DIFFERENCES
E. G. Aiken and A. W. Lau Apr. 1966 18 p refs
(STB-66-28; AD-482390)

An investigation of memory for the pitch of a short duration pure tone pulse was conducted. Utilizing an 800 cps standard stimulus with comparison stimulus separations of 0, ± 3 , ± 4 , ± 5 cps, discriminability and constant error measures were taken with .95, 4.5, and 8.9 sec interstimulus separations. The data justify the following conclusions: (1) Pitch discrimination shows no reliable change over the interval from .95 to 8.9 sec. (2) The nature of the incorrect responses indicates an increasing willingness to report a pitch difference as the interstimulus interval increases. (3) A bias in reporting more lower than higher pitch differences at the .95 sec interval reverses at 4.5 sec, and is absent at 8.9 sec. (4) The data are consistent with much previous research involving pure tone discrimination, and with most of the data on Doppler discrimination employing sonar stimulus materials.
Author

N66-32571# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
FATIGUE AND STRESS STUDIES: AN IMPROVED SEMI-AUTOMATED PROCEDURE FOR FLUOROMETRIC DETERMINATION OF PLASMA CATECHOLAMINES
Vincent Fiorica Apr. 1966 14 p refs
(AM-66-6)

A semiautomated technique is described for the estimation of total catecholamines in plasma by the trihydroxyindole procedure. The method utilizes conventional alumina-column chromatography for isolation of the amines. Catecholamine oxidation, tautomerization, and fluorescence detection are accomplished by an automated chemical system. Recoveries from plasma of 0.01 and 0.02 μg total catecholamines/10-ml sample were $86.4\% \pm 8.9\%$ (SD) and $85.6\% \pm 5.8\%$ (SD), respectively. Total catecholamine level in resting human plasma, determined by the present technique, was 0.89 ± 0.15 (SD) $\mu\text{g/l}$.
Author

N66-32572# Gt. Brit. Ministry of Aviation, London.
INVESTIGATIONS ON THE STRESS IMPOSED ON AIRCREW IN CIVIL JET AIRCRAFT DURING LONG-RANGE FLIGHTS, REPORT OF THE NORTH ATLANTIC ROUTE [UNTERSUCHUNGEN ZUR BELASTUNG DES BORDPERSONALS AUF FERNFLUEGEN MIT DUSENMASCHINEN BERICHT UBER DIE ERGEBNISSE AUF DER NORDATLANTIKROUTE]

H. Bruner, K. E. Klein, and S. Ruff. Jul. 1966. 57 p. refs
Transl. into ENGLISH from German Rept. DLR-FB(65-44). Oct. 1965. 68 p.

(TIL-T-5648) CFSTI: HC \$2.50/MF \$0.50

Results of an investigation on the stress level affecting aircrews on long distance jet aircraft flights are reported. A total of 75 crew members were studied on 25 regular line flights. The mean stress and recovery during the various periods of flight were measured by means of the deviations of the psychophysiological parameters from the daily normal values of a control group who were performing stationary office and laboratory duties. Results form a basis for evaluating the physiological work load on the investigated flight routes, and yield data on the influence of strenuous flights during certain day/night hours upon flight safety.
S.P.

N66-32574# Joint Publications Research Service, Washington, D. C.

SECOND ALL-UNION CONFERENCE ON BIONICS

G. T. Kazmin. 25 Jul. 1966. 12 p. Transl. into ENGLISH from Avtomat. i Telemekh. (Moscow), no. 5. 1966. p. 204-206. Conf. held in Moscow, 20-24 Dec. 1965.

(JPRS-36667; TT-66-33098) CFSTI: \$1.00

General problems in the field of bionics are briefly reviewed in relation to the necessity for developing cooperative efforts between the various specialist fields such as engineers, biologists, physicists, mathematicians, and chemists. Areas in which research is concentrated are highlighted, and summarized data are presented on several conference reports including the informational, material, and energetic aspects of bionics; technical solutions and equipment; and construction of models and electronic devices.
H.S.W.

N66-32602# Joint Publications Research Service, Washington, D. C.

AEROSPACE BIOLOGY AND THE MAGNETIC FIELD

Yu. A. Kholodov. 3 Aug. 1966. 9 p. ref. Transl. into ENGLISH from Priroda (Moscow), no. 4. 1966. p. 114-115.
(JPRS-36820; TT-66-33250) CFSTI: \$1.00

The effects of artificial weak and strong magnetic fields on biological organisms are considered. Since artificial magnetic fields may be used to protect spacecraft from ionizing radiation, protection from the fields themselves may be necessary. Some research results are reviewed, most of which were obtained through the exposure of biological subjects to increased magnetic fields. Growth changes are reported

for *Chlorella* and sea urchin eggs. It was found that in primates there occurs a change in the activity of the nervous and cardiovascular systems. Weak magnetic fields have produced a decrease in the light flash fusion threshold of humans. An inhibition in the growth of cancer cells occurred after exposure to a magnetic field of 600 ergs. It is stated that further research will be necessary to ensure spaceflight security and to elucidate terrestrial magnetic effects.
E.A.O.

N66-32618*# Goodyear Aerospace Corp., Litchfield Park, Ariz.

SPATIAL ORIENTATION IN A WEIGHTLESS ENVIRONMENT Summary Report (Final)

Robert Mayne. 15 Apr. 1966. 60 p. refs

(Contract NAS9-4460)

(NASA-CR-65429; GERA-1158) CFSTI: HC \$2.50/MF \$0.50
CSCL 06S

A summary on the various studies on functional aspects of spatial orientation in the control of body movements is presented and a theory of the separation of gravity from acceleration is amplified to explain the reactions of man in space situations. Vertical direction determination and the attempted cancellation of gravity effects by head movements evolved as most likely causes of disturbances when man transfers from an earth to a weightless environment without prior adaptive exercises. Theoretical and experimental results indicate that otoliths and semicircular canals operate synergistically to perform the directional orientations; adaptation to a rotating platform seems to be more difficult than adaptation to a slow rotating room in an earth environment. The computer model simulation of motion sickness production by rotating chair mechanics was analyzed and a physical computer design concept for a simplified situation is outlined.
G.G.

N66-32619*# General Electric Co., Philadelphia, Pa. Missile and Space Div.

HYDRO-JOHN ENGINEERING PROTOTYPE, THE DESIGN, DEVELOPMENT AND FABRICATION OF A WASTE MANAGEMENT AND WATER RECOVERY SYSTEM

R. W. Murray, F. Rudek, L. Cooper, and R. Miller. Oct. 1964. 92 p.

(Contract NAS9-1301)

(NASA-CR-65436) CFSTI: HC \$2.50/MF \$0.75 CSCL 06I

A Hydro-John engineering prototype was developed that provides for collection and storage of human excrement and the recovery of potable water under normal conditions but can be extended to function in ecological space systems under zero gravity conditions. Laboratory tests on fecal transport methods, an operational breadboard, disinfectants, water potability, ammonia control and bacterial control, and flush water contamination formed the basis for this self cleansing prototype system. This described semi-automatic system utilizes special container configurations to provide liquid positioning in zero gravity conditions.
G.G.

N66-32620*# Institute for Biological Research, Los Angeles, Calif.

PHYSIOLOGIC EFFECTS OF DIETARY CLAY SUPPLEMENTS Final Report, 1 Dec. 1964-15 Jun. 1965

Benjamin H. Ershoff and Gurwant S. Bajwa. 19 Jul. 1965. 72 p. refs

(Contract NAS9-3905)

(NASA-CR-65427) CFSTI: HC \$2.50/MF \$0.75 CSCL 06H

Comparative effects of clay supplements in the diets of immature male rats, hamsters, mice, and miniature pigs fed a

low calcium, low protein, low fat ration were observed by increment in their body weight and microscopic structure of their long bones. Findings indicated that clay supplement prevented rachitic changes and promoted bone development in several species of young growing animals; the effects were proportional to the level of clay supplement given. Protective effects of the clay supplement when fed with casein and protein containing rations were attributed in large part to some factors other than its calcium content. G. G.

N66-32621*# Republic Aviation Corp., Farmingdale, N. Y.
EFFECT OF DIET AND ATMOSPHERE ON INTESTINAL AND SKIN FLORA. VOLUME I: EXPERIMENTAL DATA
Lorraine S. Gall and Phyllis E. Riely [1964] 232 p refs
(Contract NAS9-4172)

(NASA-CR-65437) CFSTI: HC \$3.75/MF \$1.25 CSCL 06M

Microbiological determinations were carried out on 2 male subjects confined in a control area for 34 days, and on a group of 6 male subjects in a chamber that was at altitude with 100% oxygen for 20 days. Minimum hygienic procedures with and without space suits and space type diets were maintained. Plate counting and serial dilution analyses of the aerobic and anaerobic samples showed a buildup of bacteria in all body areas and the environments as the experiment progressed. The buildup was greatest in those body areas where sweating occurred. Microbiological procedures identified staphylococci, or micrococci and corynebacteria as the organisms involved in bacterial buildup in the axilla, groin, and G.P. Anaerobes isolated in this study were principally from the feces with the GD types occurring more frequently during the latter part of the study. Some potentially pathogenic bacteria were isolated from some subjects, but did not cause overt illness and did not seem to transfer readily to the other subjects. G. G.

N66-32622*# Republic Aviation Div., Fairchild Hiller Corp., Farmingdale, N. Y.
EFFECT OF DIET AND ATMOSPHERE ON INTESTINAL AND SKIN FLORA. VOLUME II: LITERATURE SURVEY
Phyllis E. Riely and Lorraine S. Gall [1965] 148 p refs
(Contract NAS9-4172)

(NASA-CR-65438) CFSTI: HC \$3.00/MF \$1.00 CSCL 06M

A literature survey on the varied population of differing microorganisms of the human skin is presented that encompasses both aerobic and anaerobic bacteria, yeasts, molds, fungi, actinomycetes, and viruses. Included are the specialized skin areas of the anal fold, axilla, external ear, eye, fingernails, scalp, toenails, and umbilicus, but excluded are microorganisms growing on mucous surfaces. Also considered are microbiological sampling studies on groups of men having been confined for various periods of time in a closed environment under ambient atmospheric as well as under 100% oxygen conditions. G. G.

N66-32630*# Beckman Instruments, Inc., Fullerton, Calif.
Advanced Technology Operations.

DESIGN, DEVELOPMENT, FABRICATION, TESTING AND DELIVERY OF FIVE (5) CARDIOVASCULAR REFLEX CONDITIONING SYSTEMS Final Report

14 March 1966 44 p

(Contract NAS9-5331)

(NASA-CR-65435, FR-2408-101) CFSTI: HC \$2.00/MF \$0.50 CSCL 06B

Details are presented on a cardiovascular reflex conditioning system for minimizing the effects of prolonged weightlessness upon astronauts. This system which provides for periodic inflation of pneumatic cuffs around the proximal attachment of

the lower extremities, is generally described and the different equipment required for the Apollo and Gemini programs are delineated. The operating principles are given for the input, output, cycling time, pneumatic circuit and control, single-stage regulator and relief valve, and pneumatic oscillator, and preliminary test results on a prototype oscillator assembly are evaluated. Qualification test failures are summarized and the corrective action taken is discussed. The results of acceptance testing, in which the system met all the basic performance requirements, are also included. A. G. O.

N66-32637*# Naval School of Aviation Medicine, Pensacola, Fla. Aerospace Medical Inst.

BIOCHEMICAL CHANGES OCCURRING WITH ADAPTATION TO ACCELERATIVE FORCES DURING ROTATION
James F. Colehour and Ashton Graybiel 25 Apr 1966 17 p refs
(NASA Order R-93)

(NASA-CR-76949, NAMI-959) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Biochemical measures of mild stress effects due to rotation are presented as part of an habituation experiment in which four subjects were exposed to a rotation environment over a six-day period. It is pointed out that head movements out of the plane of the room's rotation were essential to generate the Coriolis forces contributing the bizarre stimulation of the semicircular canals. General symptomatology is reported including the patterns of epinephrine, norepinephrine, and corticoid excretion; variations in total leukocyte count, eosinophiles, and carbon dioxide tension, and excretion rates of calcium, sodium, and potassium. S. P.

N66-32646# Flying Personnel Research Committee, London (England).

ACCELERATION ATELECTASIS—SOME FACTORS MODIFYING ITS OCCURRENCE AND MAGNITUDE

D. H. Glaister Jan. 1965 17 p refs

(FPRC/MEMO-220) CFSTI: HC \$1.00/MF \$0.50

This paper attempts to define thresholds for acceleration and time below which atelectasis does not occur, and investigates the effects of temporary changes in the inspired gas composition and pressure on the development of atelectasis. Acceleration atelectasis was studied by measuring the reduction in vital capacity (VC) following centrifuge exposure to positive acceleration with subjects wearing anti-g suits and breathing 100% O₂. During acceleration, VC decreases exponentially with time and depends on the individual's susceptibility. Changing from breathing O₂ to air with the onset of plateau acceleration did not affect the degree of VC limitation which resulted and confirms the theory that the alveoli responsible are poorly ventilated. Breathing O₂ at a positive pressure of 30 cm H₂O during the plateau acceleration halved the resulting VC production in three subjects and completely prevented it in a fourth. This may be due to the fact that pressure breathing increases the Functional Residual Capacity (FRC) which increases the lower lung ventilation. The anti-g suit's action in promoting lung collapse was mediated solely through its abdominal compression. This is thought to reduce the FRC thus decreasing the lower lung ventilation. R. N. A.

N66-32647# Japanese Air Self-Defense Force, Tokyo Aero-Medical Lab.

BIBLIOGRAPHY OF AVIATION MEDICINE IN JAPAN

1 Jul. 1963 318 p refs In JAPANESE

CFSTI: HC \$4.25/MF \$1.75

An annotated bibliography of research in aviation medicine of the past 50 years is presented. Topics such as respiration, body chemistry, and noise are included. Trans. by J. T. C.

N66-32655# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

THE DETERMINATION OF ACTINIUM-227 IN URINE

P. J. Gomm and J. D. Eakins Mar. 1966 27 p refs

(AERE-R-4972)

A new method for the determination of actinium-227 in urine is described. After oxidation of the urine sample with nitric acid, actinium is coprecipitated on barium sulphate. The barium sulphate is converted to carbonate, dissolved in acid and the actinium coprecipitated on ferric hydroxide to remove barium and radium. The ferric hydroxide precipitate is dissolved in a mixture of nitric and hydrochloric acids and the solution passed through an anion exchange column upon which iron, thorium and protactinium are absorbed. The column effluent which contains the actinium is essentially free from solids. Sources for alpha counting may be prepared either by evaporation or by electrodeposition. Actinium recoveries of about 80 per cent are obtained, with good decontamination from protactinium, thorium, radium, polonium and lead. The use of actinium-228 as a tracer for actinium-227 is also discussed. A method is described for separating radium-228 from aged thorium-232 and 'milking' actinium-228 from the radium-228 as required. Author

N66-32658# United Kingdom Atomic Energy Authority, Harwell (England). Radiological Protection Div.

MAXIMUM PERMISSIBLE CONCENTRATIONS IN AIR FOR COMPOUNDS OF Pu-239

G. W. Dolphin, K. P. Duncan, H. J. Dunster, and S. Jackson Apr. 1966 18 p refs

(AHSB(RP)-R-69) HMSO: 2s 6d

The derivation of the values for $(MPC)_a$ for soluble and insoluble plutonium is briefly reviewed for the cases of bone, liver and lungs as organs of reference. In the model used for the calculation of the $(MPC)_a$ for insoluble radioactive dusts in the lung it is assumed that 12-1/2% of the inhaled radioactivity is transferred to the body fluids. This transfer could lead to a build up of radioactivity in a body organ other than the lung. However recent data both from dog experiments and from human autopsies show that this is not the case and the lung is the critical organ following inhalation of plutonium oxide. Inhaled plutonium nitrate is fairly readily transferred to the liver and bone and consequently the more restrictive $(MPC)_a$ for soluble plutonium, must be used when this compound is involved. A list of plutonium compounds is given and divided into those compounds behaving like plutonium nitrate and those behaving like plutonium oxide in the human body. Author

IAA ENTRIES

A66-31832

STUDIES ON THE POST-HYPOXIC SYNDROMES.

Haruo Ikegami (Japan Air Self-Defense Force, Aero-Medical Laboratory, Tachikawa, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, Dec. 1965, p. 1-12. 17 refs. In Japanese.

Study by EEG frequency analysis and performance tests of the physical reactions of human beings to pure oxygen inhalation interrupting previous hypoxia. Eleven healthy males were exposed to a simulated altitude of 8000 m with oxygen masks in a low-pressure chamber. In the simulated flights EEGs were recorded for 15 min, during which time subjects were induced to become hypoxic for 5 min by switching their oxygen supply to ambient air, and then made to recover by switching back to pure oxygen. The EEGs showed marked slowing during the hypoxic periods, and then reverted to the arousal pattern shortly after reoxygenation. The performance tests showed an abrupt decrease in mental performance just after reoxygenation in three cases, and quick recovery within 30 sec. Probable mechanisms of the posthypoxic syndromes are discussed. F. R. L.

A66-31833

INFLUENCE OF THE SCRATCH ON THE WIND SHIELD UPON THE VISUAL FUNCTIONS TO THE MOVING OBJECT.

Akihiro Suzumura (Nagoya University, Research Institute of Environmental Medicine, Nagoya, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, Dec. 1965, p. 13-20. 11 refs. In Japanese.

Experimental study of the effects of a windshield scratch on depth perception, visual acuity, and fatigue. It was found that, even though visibility of a stationary object was not affected by a windshield scratch, such a scratch noticeably lowered the visibility of a moving object. Fatigue was induced to a remarkable extent when the moving object was observed through a scratched windshield. F. R. L.

A66-31875

ACCELERATED PYRUVATE DECOMPOSITION IN AQUEOUS SOLUTION CAUSED BY THERMAL PROTEINOIDS [DER DURCH THERMISCHE PROTEINOIDE BESCHLEUNIGTE PYRUVAT-ABBAU IN WÄSSRIGER LÖSUNG].

G. Krampitz (Bonn, Universität, Institut für Anatomie und Physiologie der Haustiere, Bonn, West Germany; Miami, University Institute of Molecular Evolution, Coral Gables, Fla.) and H. Hardebeck (EURATOM and Kernforschungsanlage Jülich, Institut für Landwirtschaft, Jülich, West Germany; Miami, University, Institute of Molecular Evolution, Coral Gables, Fla.).

Naturwissenschaften, vol. 53, no. 3, 1966, p. 81, 82. In German. Research supported by the Deutsche Forschungsgemeinschaft and the University of Miami; Grant No. NSG-689.

Study of the decomposition of sodium pyruvate in water under the action of proteinoids of the type produced by thermal condensation of dry amino acids under the conditions existing on the primordial earth. The technique of synthesizing the amino acid copolymers is described. CO₂ and other by-products resulting from the reaction of the proteinoids with the sodium pyruvate were identified; the CO₂ evolved was quantitatively measured by precipitation with BaCO₃. The results for various amino copolymers are expressed in a table. D. P. F.

A66-31948

IMPULSIVE NOISE STUDIES AND TEMPORARY THRESHOLD SHIFT.

C. G. Rice and R. R. A. Coles (Southampton, University, Institute of Sound and Vibration Research, Southampton, England).

Congrès International d'Acoustique, 5th, Liège, Belgium, Sept. 7-14, 1965, Paper. 4 p. 10 refs.

Discussion of the relationship between the physical characteristics of impulsive noise and the resulting hearing impairment likely to occur from overexposure. Damage risk criteria (DRC) are examined with reference to body and ear exposure. By use of a temporary threshold shift reduction (TTSR) technique, useful information on the effects of high-intensity impulsive noise on hearing was obtained. Results showed a relationship between temporary threshold shift (TTS) and the peak level and duration of the impulsive noises. F. R. L.

A66-31982

PSYCHIATRIC SELECTION OF CANDIDATES FOR SPACE MISSIONS.

Carlos J. G. Perry (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Psychiatry Branch, Brooks AFB, Tex.).

(American Medical Association, Section on Military Medicine, Annual Convention, 114th, New York, N.Y., June 22, 1965, Paper.) American Medical Association, Journal, vol. 194, Nov. 22, 1965, p. 841-844. 14 refs.

USAF-sponsored research.

Psychiatric evaluation of 15 candidates for a space mission by a team of two psychiatrists and a clinical psychologist. In the situation of being asked to select candidates for a space mission the primary problem is in identifying the most healthy individual. The 15 career-officer pilots were all graduates of or enrolled in the USAF Aerospace Research Pilots School and were selected from 60 possible candidates by a board of officials from the school. All of the candidates were found to be qualified as being free from psychopathology. Beyond this, a rank order of the candidates was developed, based on positive factors of suitability for the assignment. It is concluded that there are no ready-made guidelines, specific stress situations, or personality type qualifications on which to readily determine such a selection, and that the psychiatrist must approach such a task in a globally oriented manner, making the most of his talent for empathic understanding of the individual candidate's personality and motivations. Rank orders, as determined by the psychiatric team and by the candidates themselves, are compared. M. L.

A66-31995

DENDRITIC FIELDS OF RETINAL GANGLION CELLS OF THE RAT.

Joel E. Brown (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Cambridge, Mass.).

Journal of Neurophysiology, vol. 28, 1965, p. 1091-1100. 13 refs. Research supported by the Bell Telephone Laboratories and the Teagle Foundation; NSF Grant No. GP-2495; National Institutes of Health Grants No. MH-04737-05; No. NB-04897-02; Grant No. NSG-496; Contracts No. AF 33(615)-1747; No. DA-36-039-AMC-03200(E).

Experimental investigation of retinal ganglion cells of the rat stained in vivo with methylene blue. Based on the morphologies of the stained cells, two classes of ganglion cells were found. The dendrites of one class of cells ("tight") penetrated deep into the inner plexiform layer and had a dense arborization; the dendritic arborization of the other class ("loose") was more sparse and was found in a more shallow region of the inner plexiform layer. No multilayered cells were observed. Speculatively, these two classes are identified with receptive field types previously found by electrophysiological techniques. Tentatively, the tight cells might be those units with no demonstrable surround regions, and the loose cells those which have a center-surround type of organization. M. L.

A66-32083

THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963.

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA. Edited by S. W. Fox (Florida State University, Institute for Space Biosciences, Tallahassee; Miami, University, School of Environmental and Planetary Sciences, Institute of Molecular Evolution, Coral Gables, Fla.).

New York, Academic Press, Inc., 1965. 482 p. \$8.00.

A66-32084

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AMINO ACIDS, PEPTIDES, AND SPHERULES OBTAINED FROM "PRIMITIVE EARTH" GASES IN A SPARKING SYSTEM. Karl A. Grossenbacher and C. A. Knight (California, University, Berkeley, Calif.), p. 173-186. [See A66-32088 17-04]

THE THERMAL SYNTHESIS OF AMINO ACIDS FROM A HYPOTHETICALLY PRIMITIVE TERRESTRIAL ATMOSPHERE. Kaoru Harada and Sidney W. Fox (Florida State University, Tallahassee, Fla.), p. 187-201. 22 refs. [See A66-32089 17-04]

PRIMORDIAL ULTRAVIOLET SYNTHESIS OF NUCLEOSIDE PHOSPHATES. Carl Sagan (Harvard University, Cambridge, Mass.), p. 207-219. 15 refs. [See A66-32090 17-04]

ABIOLOGICAL SYNTHESIS OF SOME NUCLEIC ACID CONSTITUENTS. Cyril Ponnamperna (NASA, Ames Research Center, Calif.), p. 221-242. 23 refs. [See A66-32091 17-04]

PROBABLE SYNTHESIS OF PORPHINE-LIKE SUBSTANCES DURING CHEMICAL EVOLUTION. Anton Szutka (Detroit, University, Detroit, Mich.), p. 243-254. 43 refs. [See A66-32092 17-04]

MACROMOLECULES.

PROJECTING BACKWARD FROM THE PRESENT STAGE OF EVOLUTION OF BIOSYNTHESIS. Fritz Lipmann (Rockefeller Institute, New York, N. Y.), p. 259-280. 17 refs. [See A66-32093 17-04]

THERMAL POLYCONDENSATION OF FREE AMINO ACIDS WITH POLYPHOSPHORIC ACID. Kaoru Harada and Sidney W. Fox (Florida State University, Tallahassee, Fla.), p. 289-298. 20 refs. [See A66-32094 17-04]

SYNTHESIS OF NUCLEOSIDES AND POLYNUCLEOTIDES WITH METAPHOSPHATE ESTERS. Gerhard Schramm (Max-Planck-Institut für Virusforschung, Tübingen, West Germany), p. 299-315. 12 refs. [See A66-32095 17-04]

THERMAL CONDENSATION OF CYTIDYLIC ACID IN THE PRESENCE OF POLYPHOSPHORIC ACID. A. W. Schwartz, E. Bradley, and S. W. Fox (Florida State University, Tallahassee, Fla.), p. 317-326. 5 refs. [See A66-32096 17-04]

MODELS OF PRECELLULAR ORGANIZATION.

THE PATHWAYS OF THE PRIMARY DEVELOPMENT OF METABOLISM AND ARTIFICIAL MODELING OF THIS DEVELOPMENT IN COACERVATE DROPS. A. I. Oparin (Academy of Sciences, Moscow, USSR), p. 331-346. [See A66-32097 17-04]

MORPHOLOGY AND CHEMISTRY OF MICROSPHERES FROM PROTEINOID. Richard S. Young (NASA, Ames Research Center, Calif.), p. 347-357. 9 refs. [See A66-32098 17-04]

SIMULATED NATURAL EXPERIMENTS IN SPONTANEOUS ORGANIZATION OF MORPHOLOGICAL UNITS FROM PROTEINOID. Sidney W. Fox (Florida State University, Tallahassee; Miami, University, Coral Gables, Fla.), p. 361-382. 17 refs. [See A66-32099 17-04]

PERSPECTIVES. II.

THE RECOGNITION OF HEREDITARY ORDER IN PRIMITIVE CHEMICAL SYSTEMS. H. H. Pattee (Stanford University, Stanford, Calif.), p. 385-405. 52 refs. [See A66-32100 17-04]

CODING TRIPLETS IN THE EVOLUTION OF HEMOGLOBIN AND CYTOCHROMES C GENES. T. H. Jukes (California, University, Berkeley, Calif.), p. 407-436. 37 refs. [See A66-32101 17-04]

THE ROLE OF LIGHT IN EVOLUTION - THE TRANSITION FROM A ONE QUANTUM TO A TWO QUANTA MECHANISM. Hans Gaffron (Florida State University, Tallahassee, Fla.), p. 437-460. 25 refs. [See A66-32102 17-04]

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A66-32084

DATA NEEDED FOR A BLUEPRINT OF THE FIRST ORGANISM.

J. B. S. Haldane (Genetics and Biometry Laboratory, Bhubaneswar, India).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 11-15; Discussion, p. 15-18.

Suggestion as to how the first organisms might have come into being. It is considered unnecessary to include DNA in the specification of a minimal organism. It is suggested that life - defined as indefinite replication of patterns of large molecules - can be based on RNA without DNA. The question then of how much RNA would be required is considered. It is proposed that in favorable circumstances a single RNA chain could suffice to specify a peptide. Four steps are considered necessary once the amount of RNA needed to specify a protein is reduced to a minimum: formation of nucleotides, coupling of nucleotides to form chains, combination of amino acids with ATP or some related substance, and coupling of these amino acids to form a peptide chain. The suggestion is made that the first organisms may have been similar to the tobacco mosaic virus.

M.L.

A66-32085

MOLECULAR MATRICES FOR LIVING SYSTEMS.

J. D. Bernal (London, University, Birkbeck College, Dept. of Physics, London, England).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 65-88.

Review of the theoretical and experimental work to date in molecular biology that may ultimately explain how life originally arose. The meteoritic theory of the origin of life is reviewed, with emphasis on the carbonaceous compounds found in some meteorites. A new hypothesis is discussed, in which it is proposed that carbonaceous compounds may have originated from a condensation of low-temperature gaseous molecules on the surface of a metallic ion and silicate dust, such as may have been present during the formation of the earth. It is considered that, whatever the origin of life, the second stage of its development occurred on earth, especially in its hydrosphere. The question of how the basic elements of molecular reproduction themselves originated is examined, and it is considered that the essential principle of reproduction is implicit in crystallization itself. Thirty-two essential questions to be answered if a comprehensive theory of the origin of life is to be achieved are listed.

M.L.

A66-32086

TWO ASPECTS OF THE GEOCHEMISTRY OF AMINO ACIDS.

J. R. Vallentyne (Cornell University, Dept. of Zoology, Ithaca, N. Y.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 105-120; Discussion, p. 120-125. 21 refs.

NSF Grant No. G-12452.

Review of chemical analyses of the amino-acid content of carbonaceous and noncarbonaceous chondrites. With regard to the origin of amino acids in meteorites, four possibilities (as enumerated by Kaplan) are discussed: origin by catalysis during laboratory treatment of the samples, contamination with terrestrial matter, biogenesis, and abiogenesis; the last two may be terrestrial or extraterrestrial. Amino acid contents of dust are compared with similar data on meteorites. Amino acids and a substance tentatively identified as urea have been detected in hydrolyzates of samples taken from the Orgueil and Holbrook meteorites. Quantitative data on amino acids are given for four samples of dust; the total concentrations were found to be about 1000 times higher than in meteorites. It is believed that attention might profitably be given to rates of decomposition in "soup" experiments; labile compounds necessary for biopoiesis could exert a controlling influence on the rate of evolution of eobionts in a primitive sea.

M.L.

A66-32087**STAGES AND MECHANISMS OF PREBIOLOGICAL ORGANIC SYNTHESIS.**

J. Oró (Houston, University, Dept. of Chemistry, Houston, Tex.). IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 137-162; Discussion, p. 162-171. 58 refs.

Grant No. NSG-257-62.

Consideration of the probable stages of synthesis of organic compounds prior to and during the formation of the earth. Some of the probable mechanisms that are involved in the abiotic synthesis of amino acids, purines, pyrimidines, and monosaccharides are discussed, limited to results based on laboratory studies and omitting consideration of more complex biological molecules. The stages of prebiological organic compound synthesis are outlined, and the conditions and models of the early planetary stage are examined. Five major conclusions are made, including the fact that observations on the composition of carbon star atmospheres, interstellar matter, the Jovian planets, comets, and meteorites indicate that the synthesis of organic compounds in the universe is a more general process than has been thought heretofore.

M.L.

A66-32088**AMINO ACIDS, PEPTIDES, AND SPHERULES OBTAINED FROM "PRIMITIVE EARTH" GASES IN A SPARKING SYSTEM.**

Karl A. Grossenbacher and C. A. Knight (California, University, Dept. of Soils and Plant Nutrition, and Virus Laboratory, Berkeley, Calif.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 173-183; Discussion, p. 183-186.

Repetition and modification of the experimental work of Miller and Urey in which sparking in a closed atmosphere of ammonia, methane, hydrogen, and water produced amino acids and other organic materials. The experimental apparatus is described in which a mixture of less than 1 atmosphere of NH_3 , 1 liter of water, and approximately 1/2 atmosphere each of methane and hydrogen were subjected to sparking for from 24 hr to 10-30 days. The presence of amino acids in the products was demonstrated by paper chromatography. Several electron micrographs of the products obtained are presented. It is concluded that (1) under some conditions the formation of compounds appeared to be autocatalytic, (2) 10 different amino acids were produced, (3) peptides were formed, and (4) spherulites ranging from 50 to 800 Å in diameter were produced and these consist in small part of organic matter.

M.L.

A66-32089**THE THERMAL SYNTHESIS OF AMINO ACIDS FROM A HYPOTHETICALLY PRIMITIVE TERRESTRIAL ATMOSPHERE.**

Kaoru Harada and Sidney W. Fox (Florida State University, Institute for Space Biosciences, Tallahassee, Fla.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 187-194; Discussion, p. 194-201. 22 refs.

Grant No. NSG-173-62.

Experimental confirmation of the thesis that amino acids can be thermally synthesized from a primitive terrestrial atmosphere. The experimental procedure is described in which a gas mixture consisting of CH_4 , NH_3 , and H_2O was passed through silica sand, silica gel, volcanic lava, and alumina, solid materials which are common in the earth's crust, at temperatures of 900-1100°C in a glass reaction tube and the products analyzed by an automatic amino acid analyzer. Data are presented in which the amounts and kinds of amino acids produced by thermal synthesis are compared with those produced by electric discharge synthesis. It is concluded that simple gases are thermally convertible to most of the amino acids common to protein in a way that is sequentially compatible with other aspects of the thermal theory of biochemical origins. The composition of amino acids obtained varies significantly with temperature and with the nature of the solid surface on which the vapor phase reaction occurs. Aromatic amino acids are found in the products.

M.L.

A66-32090**PRIMORDIAL ULTRAVIOLET SYNTHESIS OF NUCLEOSIDE PHOSPHATES.**

Carl Sagan (Harvard University, Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 207-219. 15 refs.

Review of the experimental and theoretical research supporting the hypothesis that the essential compounds necessary to life arose from a primitive terrestrial atmosphere through a mechanism of solar ultraviolet bombardment. Experimental work is discussed in which 2537 Å irradiation of a dilute solution of adenine, ribose, and phosphoric acid produced the nucleoside adenosine. Holland's proposal for a three-stage evolution of a terrestrial atmosphere is reviewed and built upon, and the probable amounts and wavelengths of the incident solar ultraviolet radiation are derived. A crucial part of the theory is that spontaneous polymerization of the nucleoside triphosphates could have occurred in the primitive oceans. It is concluded that the fairly efficient production of nucleoside phosphates in the experimental part of the work supports the contention that the origin of life is at last becoming a tractable scientific problem. It is suggested that the moon may contain organic matter beneath the surface, and that Jupiter is, in fact, an enormous laboratory in which chemical experiments relevant to the origin of life are being performed today.

M.L.

A66-32091**A BIOLOGICAL SYNTHESIS OF SOME NUCLEIC ACID CONSTITUENTS.**

Cyril Ponnampemuma (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

A66-32092

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.
Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 221-236; Discussion, p. 236-242. 23 refs.

Experimental investigation of abiological synthesis. The energies available for synthesis of organic compounds under primitive earth conditions are listed as solar ultraviolet (2500, 2000, and 1500 Å), electric discharges (lightning), ionizing radiation, and volcanic heat. The main purpose of the research - which used simulations of all these forms of energies - was to see whether, starting from a mixture of primitive gases, it is possible in a stepwise manner to synthesize the nucleic acid constituents. Three groups of experiments are reported upon: in the first, the starting materials were methane, ammonia, and water; in the second, hydrogen cyanide was the raw material; and in the third, formaldehyde was used. Each group of experiments is described. Thus far, the syntheses of the purines, adenine, guanine, ribose and deoxyribose sugars, the nucleoside adenosine, and the nucleotides AMP, ADP, and ATP have been demonstrated. It is concluded that these results are relevant to the problem of the origin of life, as the reaction conditions are aqueous, the concentrations of materials are very low, and the energy sources are those most likely to have existed under primitive earth conditions. M.L.

A66-32092

PROBABLE SYNTHESIS OF PORPHINE-LIKE SUBSTANCES DURING CHEMICAL EVOLUTION.

Anton Szutka (Detroit, University, Dept. of Chemistry, Detroit, Mich.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 243-252; Discussion, p. 252-254. 43 refs.

Grant No. NSG-226-62.

Experimental investigation of the possibility that porphyrins or porphinelike substances could have formed under the conditions of a primitive earth. Observations are presented having a direct bearing on the formation of the organic milieu, namely, the synthesis of porphinelike substances from simple precursors. Mixtures of pyrrole, benzaldehyde, pyridine, and zinc acetate were irradiated with ionizing radiation (Co 60 gamma rays) and other mixtures with UV. In each case the resulting reddish solution was chromatographically analyzed. It is concluded that the synthesis of porphinelike structures in the presence of oxygen from precursors has been demonstrated. Results also indicate that the presence of water, or rather the suspension of organic matter in water, increases the yield of porphinelike substances considerably. The increase in the yield of these substances on standing in chloroform solutions confirms Calvin's postulated process of autocatalysis. M.L.

A66-32093

PROJECTING BACKWARD FROM THE PRESENT STAGE OF EVOLUTION OF BIOSYNTHESIS.

Fritz Lipmann (Rockefeller Institute, New York, N.Y.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 259-273; Discussion, p. 274-280. 17 refs.

Brief survey of theoretical and experimental work concerning the origin of life in which the assumption that a genetic information transfer system is essential at the very start of life is questioned. The need for more data on bacterial evolution is considered necessary. Two principles of biosynthesis are discussed: (1) organisms build up their organic materials chemosynthetically from small units, and (2) these units are "glued" together by ATP. It is proposed that

coupling of chemosynthesis to electron transport might have been the first event on the way to life, in parallel with nonbiological energy-coupling mechanisms on earth, such as the water cycle. Polyphosphate is considered preferred as the primeval energy carrier. It is suggested that the iron-containing, amino acid-deficient hydrogen carrier, ferredoxin, may be representative of the primitive structures involved in protein evolution. M.L.

A66-32094

THERMAL POLYCONDENSATION OF FREE AMINO ACIDS WITH POLYPHOSPHORIC ACID.

Kaoru Harada and Sidney W. Fox (Florida State University, Institute for Space Biosciences, Tallahassee, Fla.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 289-297; Discussion, J. M. Buchanan (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.) and D. L. Rohlfsing (Florida State University, Institute for Space Biosciences, Tallahassee, Fla.), p. 297, 298. 20 refs.

Grant No. NSG-173-62.

Experimental investigation in which polyphosphoric acid is used to synthesize proteinoid at 100°C and below. Thermal polycondensations were performed in the range of 70 to 130°C during a reaction time of 50 to 250 hr. Analyses of the amino acid composition, N-terminal amino acid composition, and molecular weight of the reaction products are discussed. Both commercially prepared polyphosphoric acid (PPA) and thermally prepared PPA were used. Experimental procedures are described. Data are tabulated on the yield and composition of the resulting polymers. M.L.

A66-32095

SYNTHESIS OF NUCLEOSIDES AND POLYNUCLEOTIDES WITH METAPHOSPHATE ESTERS.

Gerhard Schramm (Max-Planck-Institut für Virusforschung, Tübingen, West Germany).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 299-309; Discussion, p. 309-315. 12 refs.

Review of experimental evidence to date supporting the hypothesis that one of the steps involved in the evolution of life from a primitive earth condition was the synthesis of nucleosides and polynucleotides with metaphosphate esters (MPE). The synthesis of adenosine from ribose and adenine with MPE at different proton concentrations is examined. Although in the absence of a solvent and the presence of excess MPE, nucleosides are phosphorylated and condensed, clearer results are obtained if nucleotides are used as starting material. It is concluded that the results demonstrate that polynucleotides can be formed from sugars and heterocyclic bases by means of MPE, but that the nucleotides are distributed randomly and have no definite sequence, and the products have various molecular weights and structures. M.L.

A66-32096

THERMAL CONDENSATION OF CYTIDYLIC ACID IN THE PRESENCE OF POLYPHOSPHORIC ACID.

A. W. Schwartz, E. Bradley, and S. W. Fox (Florida State University, Institute for Space Biosciences and Dept. of Chemistry, Tallahassee, Fla.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 317-325; Discussion, G. Schramm (Max-Planck-Institut für Virusforschung, Tübingen, West Germany), p. 325, 326. 5 refs.

Grant No. NSG-173-62.

Experimental study of the effects of free polyphosphoric acid on mixtures of purines, pyrimidines, and ribose, and also on nucleosides. The preparation of cytidylic acid by thermal condensation of mononucleotides in the presence of polyphosphoric acid is reported. Several preparations of polyphosphoric acid were used, some obtained commercially, and others synthesized from phosphorus pentoxide and/or phosphoric acid. The experimental sequence is detailed data are presented on the composition of reaction mixtures; a UV absorption spectrum of a polymer of cytidylic acid is included. The results of some preliminary enzyme experiments, used as a first approach to characterizing the resulting materials, are discussed.

M.L.

A66-32097

THE PATHWAYS OF THE PRIMARY DEVELOPMENT OF METABOLISM AND ARTIFICIAL MODELING OF THIS DEVELOPMENT IN COACERVATE DROPS.

A. I. Oparin (Academy of Sciences, Institute of Biochemistry, Moscow, USSR).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 331-341; Discussion, p. 341-346.

Experimental investigation of the polymerization of nucleotides (e.g., polyadenine synthesis) from ADP, using well known methods employing bacterial polynucleotide phosphorylase as catalyst but proceeding in the presence of or in parallel with the production of another polymer (e.g., polypeptide). It is found that the solution gradually becomes opaque under these conditions, which is related to the fact that, having reached a certain size, the polymer particles combine into multimolecular aggregations separating from the solution as coacervate drops. Various photomicrographs of such drops prepared under different conditions are presented. It is found that as a result of the formation of drops, the equilibrium of the polymerization reaction sharply shifts toward synthesis. Several schemes by which such drops and their reaction-accelerating effects might have originated under primitive earth conditions are described. The implications of these results in regard to theories of the origin of life are considered.

M.L.

A66-32098

MORPHOLOGY AND CHEMISTRY OF MICROSPHERES FROM PROTEINOID.

Richard S. Young (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04].

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 347-356; Discussion, H. B. Steinbach (Chicago, University, Dept. of Zoology, Chicago, Ill.), A. I. Oparin (Academy of Sciences, Institute of Biochemistry, Moscow, USSR), and S. W. Fox (Florida State University, Institute for Space Biosciences, Tallahassee; Miami, University, School of Environmental and Planetary Sciences, Institute of Molecular Evolution, Coral Gables, Fla.), p. 356, 357. 9 refs.

Review of the experimental data supporting the use of the microsphere as a cell (or precell) model. The work of Fox and Harada is reviewed, in which microspheres were produced by solution and condensation of a "proteinoid." Eight photomicrographs of microspheres produced under different conditions are presented, and the

conditions under which each was produced are described. Obvious resemblances to actual cells are pointed out, e.g., "budding," "double membrane," etc. It is concluded that the microsphere as a model is proving to be an unusually suggestive and productive approach to an understanding of the pathways for the origin of cellular life.

M.L.

A66-32099

SIMULATED NATURAL EXPERIMENTS IN SPONTANEOUS ORGANIZATION OF MORPHOLOGICAL UNITS FROM PROTEINOID.

Sidney W. Fox (Florida State University, Institute for Space Biosciences, Tallahassee; Miami, University, School of Environmental and Planetary Sciences, Institute of Molecular Evolution, Coral Gables, Fla.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 361-373; Discussion, p. 373-382. 17 refs.

Grant No. NSG-173-62.

Review of the properties of microspheres from thermal proteinoid. The significance and attributes of these structured units are in an intimate way a function of the material from which they arise. Photomicrographs, electron micrographs, and time-lapse studies of particles formed under various conditions are presented. These particles show many cell-like characteristics. It is concluded that a principal significance is the demonstration of the emergence of both complex materials and complex microstructures, reminiscent of cells, by simple processes. The explanation is extended to permit the visualization of a spontaneous synthesis of proteinlike material sufficiently similar to yield a protocell which could spontaneously include ATP-splitting ability. Thus, it is possible to visualize a natural evolution to cells and subsequently to cellular synthesis of macromolecules.

M.L.

A66-32100

THE RECOGNITION OF HEREDITARY ORDER IN PRIMITIVE CHEMICAL SYSTEMS.

H. H. Pattee (Stanford University, Graduate School, Biophysics Laboratory, Stanford, Calif.).

IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.

Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 385-402; Discussion, P. T. Mora (U.S. Public Health Service, National Institutes of Health, Macromolecular Chemistry Section, Bethesda, Md.), J. Oro (Houston, University, Dept. of Chemistry, Houston, Tex.), and A. Szutka (Detroit, University, Dept. of Chemistry, Detroit, Mich.), p. 402-405. 52 refs.

Proposal of a new approach to origin of life experiments directed at the simplest possible level of hereditary propagation in macromolecules which may arise after a stage of spontaneous chemical evolution, but well before self-replicative biological evolution, which progresses by natural selection. It is suggested that evolution at this intermediate level of organization, termed the stage of molecular automata, would progress initially by direct feedback selection processes which correspond logically to what is called "training" in computers or individuals. It is proposed that hereditary transfer is accomplished in growing copolymers by conformation-dependent propagation rules. Well-trained aggregations of such growing copolymers may gradually gain more self-control and less direct interaction with the environment, leading directly to what is called self-replication and the completely indirect interaction with the environment which is called natural selection.

M.L.

A66-32101

CODING TRIPLETS IN THE EVOLUTION OF HEMOGLOBIN AND CYTOCHROMES C GENES.

A66-32102

T. H. Jukes (California, University, Space Sciences Laboratory, Berkeley, Calif.).
IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.
Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 407-435; Discussion, N. W. Pirie (Rothamsted Experiment Station, Harpenden, Herts., England), p. 435, 436. 37 refs.

Review of theoretical and experimental research in molecular biology in support of the fact that hemoglobin and the enzyme cytochrome have undergone evolution. The essentials of genetic coding are reviewed, and it is pointed out that current knowledge of the amino acid code depends almost entirely on biochemical experiments with the contents of bacterial cells. Experiments designed to produce enzymatic synthesis of polypeptides in systems containing amino acids, transfer ribonucleic acid (tRNA), ribosomes, and the various factors and cofactors necessary to bring about the formation of peptides in ordered sequences are discussed. The concept that groups of three consecutive bases, or triplets, in messenger RNA are each responsible for coding a single amino acid is considered. The structure, possible mutational changes, and evolution of the three types of human hemoglobin are comprehensively detailed. The amino acid sequences and their coding triplets in the hemoglobin series are tabulated. It is deduced that the parent molecule of the hemoglobins (and myoglobins) is intermediate in composition and primary structure between myoglobin and α hemoglobin, rather than being a strange "primitive" molecule. M.L.

A66-32102

THE ROLE OF LIGHT IN EVOLUTION - THE TRANSITION FROM A ONE QUANTUM TO A TWO QUANTA MECHANISM.

Hans Gaffron (Florida State University, Institute of Molecular Biophysics and Dept. of Biological Sciences, Tallahassee, Fla.).
IN: THE ORIGINS OF PREBIOLOGICAL SYSTEMS AND OF THEIR MOLECULAR MATRICES; PROCEEDINGS OF A CONFERENCE, WAKULLA SPRINGS, FLA., OCTOBER 27-30, 1963. [A66-32083 17-04]

Conference sponsored by the Institute for Space Biosciences of the Florida State University, the Eli Lilly Co., and NASA.
Edited by S. W. Fox.

New York, Academic Press, Inc., 1965, p. 437-455; Discussion, p. 455-460. 25 refs.

Research supported by the Florida State University; Contract No. Nonr-988(10); AEC Contract No. AT(40-1)-2687; Grant No. AF AFOSR 62-190.

Review of experimental and theoretical research in which the role of light in chemical and biochemical evolution is evaluated. Two kinds of photosynthetic reactions which depend on chlorophylls are distinguished, one with and the other without the evolution of oxygen; the anaerobic process, photoreduction, appears to be a less advanced or earlier form of photosynthesis. With the transition from one to the other, large quantities of oxygen began to accumulate on the surface of the earth for the first time. The specific frequencies of light waves and minimum energies needed to effect reactions in chlorophylls are examined. It is concluded that the central problem is the evolution of a pigment system which has the capacity to decompose water into its elements, and that the porphyrin pigments antedated the earliest living cell. M.L.

A66-32134

AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS.

Washington, D.C., Aerospace Medical Association, 1966. 239 p. Members, \$5.00; nonmembers, \$7.00.

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THE "STALL BARRIER" AS A NEW PREVENTIVE IN GENERAL AVIATION ACCIDENTS. C. W. Von Rosenberg, F. R. Keen (Lear Jet Corp., Wichita, Kan.), and Stanley R. Mohler (Federal Aviation

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ACCELEROGRAPHIC AND BALLISTOCARDIOGRAPHIC EVIDENCE OF INCREASED STROKE VOLUME SECONDARY TO ACUTE HIGH ALTITUDE HYPOXIA.

R. Proper, T. Nevison, and S. Mohler (Lovelace Foundation for Medical Education and Research; New Mexico, University, School of Medicine, Albuquerque, N. Mex.; Federal Aviation Agency, Office of Aviation Medicine, Oklahoma City, Okla.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 1, 2. Abridged.

Results of studies in a low-pressure chamber on 12 male subjects (20-50 yr of age) at 10,000, 15,000, 20,000, and 25,000 ft. Ballistocardiograms were recorded on the Schwarzer ultralow-frequency ballistocardiographic bed. Stroke volumes were determined, and precordial vibrations were recorded on an accelerometer. The results all suggest that stroke volume doubles during exposure to acute hypoxia at a simulated altitude of 25,000 ft. Cardiac output appears to triple on the basis of the same data.

A66-32136

ADVANCED VISION RESEARCH FOR EXTENDED SPACEFLIGHT. Walton L. Jones (NASA, Office of Advanced Research and Technology, Washington, D.C.), William H. Allen (NASA, Ames Research Center, Moffett Field, Calif.), and James F. Parker, Jr. (Bio-Technology, Inc., Arlington, Va.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 7, 8. Abridged.

Study of the visual requirements of space missions and the effectiveness with which a man will be able to meet these requirements. The approach being used in NASA to study the problems is outlined. Operational vision requirements are discussed with reference to navigation, rendezvous and docking, lunar landing, and lunar exploration. Vision protection requirements, which fall into the classes of functional protection and injury protection, are considered. F.R.L.

A66-32137

ANTIURETIC EFFECT OF +Gz GRADIENT ACCELERATION. Thomas E. Piemme (USAF, Washington, D.C.), Michael McCally, and Alvin S. Hyde (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 12, 13. Abridged.

Study to determine the effect of high-gradient acceleration on the renal clearances of free water and creatinine following a moderate water load. Five men were subjected to accelerations on the Aerospace Medical Research Laboratories spin table. An angular velocity of rotation was chosen to achieve a gradient of z-vector (long axis of the body) g force from zero at the head to a maximum of 1, 2, or 3 g at the feet. Blood and urine samples were taken before and after spin. Serum and urine creatinine and osmolality were assayed by standard methods. The results imply that the application of positive z-directed g force significantly impairs the ability to excrete a water load. That this impairment is unassociated with a change in GFR implies further that the effect is mediated through antidiuretic hormone. F.R.L.

A66-32138

BIOENGINEERING DESIGN CONSTRAINTS ON A REGENERABLE LIFE SUPPORT SYSTEM FOR EXTENDED SPACE FLIGHT.

J. R. Burnett and R. C. Armstrong (General Dynamics Corp., General Dynamics/Convair, San Diego, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 17, 18. 5 refs. Abridged.

Contract No. NAS 1-2934.

Description of an integrated, regenerative prototype of a life support system installed in a laboratory test bed capable of sustaining a four-man crew for long-duration tests. The test bed was designed to provide a reasonable measure of simulation of an earth orbital spacecraft with respect to size, internal arrangements, acoustical, and thermal characteristics. The major biological constraints placed on the system design were developed primarily from the crew model, which in turn was developed in conjunction with the development of the mission and spacecraft models. The constraints are discussed in some detail. F.R.L.

A66-32139

BIOMEDICAL EQUIPMENT REQUIREMENTS FOR MANNED SPACE FLIGHT.

F. E. Riley.

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 19, 20. Abridged.

Discussion of the severe requirements for biomedical equipment imposed by orbital research laboratories because of the nature of space-flight missions, the stress profile during ascent and reentry, prolonged mission time, limited time factor set by flight schedules, and the completeness of the biomedical investigations. Biomedical measurements involve considerably more than the selection of equipment according to usual laboratory criteria, and the final decision is usually a compromise. Attainment of an adequate design requires successive establishment of (1) requirements, (2) preliminary specifications, and (3) conceptual design. These factors are examined in some detail. F.R.L.

A66-32140

CALCIUM, NITROGEN AND PHOSPHORUS MOBILIZATION RESULTING FROM INACTIVITY.

Arthur L. Gross, Louis Krough, John W. Miesse, and Kenneth T. Roberson (Southwest Research Institute, San Antonio, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 21, 22. Abridged.

Contract No. AF 41(609)-2749.

Study of the effects of immobilization of monkeys, for periods as long as eight weeks, on their calcium, phosphorus, and nitrogen balances. Adult male monkeys were inactivated by surgical denervation, tranquilization, and plaster casts. The plaster casts were found to be the most convenient method. The animals were able to tolerate the casts for as long as eight weeks, after which time they

were removed from the casts and were soon completely recovered from the effects of immobilization. The results of the balance studies indicate that there is no apparent loss of calcium, but that there is a marked increase in the urinary excretion of phosphorus, with a concomitant decrease in fecal excretion of phosphorus, resulting in no net loss. Animals immobilized by means of plaster casts and denervation exhibited a marked negative nitrogen balance. F.R.L.

A66-32141

CARBON DIOXIDE CONTROL FOR MANNED SPACECRAFT.

R. B. Martin (NASA, Langley Research Center, Hampton, Va.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 23, 24. Abridged.

Consideration of regenerative methods of controlling carbon dioxide for the purpose of obtaining a spacecraft system weight not quite so dependent upon mission duration as a nonregenerative system. One regenerative carbon dioxide sorber is a synthetic zeolite, and this system is at present the predominant choice for intermediate duration missions. Of regenerative zeolite systems discussed and compared (molecular sieve system, vacuum desorbed system, vacuum and heat desorbed, and heat desorbed), the molecular sieve is the predominant choice for mission durations not warranting the recovery of oxygen. F.R.L.

A66-32142

COMFORT CHARTS FOR MAN IN GAS-COOLED SPACE SUIT AND SPACE CABIN.

K. L. Kuo (Grumman Aircraft Engineering Corp., Bethpage, N.Y.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 25, 26. Abridged.

Conversion of mathematical solutions, derived to express comfort level as a function of environmental parameters, into comfort charts. The parameters are: properties of gas and suit in use; mass flow rate, inlet humidity, inlet temperature, and total pressure of the suit ventilating gas; and cabin temperature. The procedure for applying the charts is outlined. F.R.L.

A66-32144

CONTAMINANT CONTROL IN SPACE CABINS - APPROACH AND RESULTS.

P. P. Mader and E. S. Mills (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 34, 35. Abridged.

Discussion of a screening program conducted to select candidate spacecraft materials on the basis of their outgassing properties. It was found that the temperature at which the experiments are conducted greatly affects the quantity and types of outgassed products. Between 80 and 120°F, only the quantity of outgassed products increases, while the chemical species remains essentially unaltered. At exposures of 200°F, the types of outgassed compounds differ drastically from those obtained at ambient conditions, and exposure to this temperature would therefore result in unrealistic data. The evolved compounds were analyzed by gas chromatography, IR, and conventional chemical methods. Identification of chromatographic peaks was based on retention ratios obtained with three substrates at two column temperatures. Atmospheric contaminants were measured during the operation of a manned space cabin simulator by continuous monitoring instruments. It was possible to follow any increase in contaminant concentration inside the cabin, and frequently to pinpoint the contaminant source. F.R.L.

A66-32145

CORRELATION BETWEEN ACCELERATION TOLERANCE AND THE MAINTENANCE OF HIGH NOREPINEPHRINE IN RAT BRAIN.

Herman W. Shmukler and B. David Polis (U.S. Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 36, 37. 6 refs. Abridged.

Experimental demonstration of a correlation between the survival time of rats subjected to acceleration stress and the cerebral level of norepinephrine. Centrifugation was carried out at 20 g (head to foot direction). The experimental endpoint of the acceleration stress was taken as the time when the heart rate slowed to 2-3 beats/sec for 5 sec. If centrifugation was stopped at this point, most of the rats survived. Tie-stressed animals were used as controls. It was apparent from the statistical data relating norepinephrine content to survival time that there was a wide range in survival times and brain norepinephrine levels of the individual rats. The highest level was found in the group which survived the longest. F.R.L.

A66-32146

CRASH AND BALLISTIC PROTECTIVE FLIGHT HELMETS.

Abraham L. Lastnik (U.S. Army, Natick Laboratories, Natick, Mass.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 38-40. 8 refs. Abridged.

Discussion of a new U.S. Army crash helmet which retains the configuration of the standard helmet but increases crash protection by using improved energy-dissipating materials. The shell of the new helmet is made of a laminated nylon fabric instead of glass cloth. Fabrication details are given. Impact and ballistic tests showed the new helmet to be consistent in design and construction. F.R.L.

A66-32148

COMPARISON OF HELIUM AND NITROGEN IN PRODUCTION OF BENDS IN SIMULATED ORBITAL FLIGHTS.

S. E. Beard, T. H. Allen, R. G. McIver, and R. W. Bancroft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 43, 44. Abridged.

Experimental study using simulated orbital flights with extravascular activities (EVA) to determine the incidence and severity in men of flyer's bends provoked by decompression in combination with exercise in a simulated space suit atmosphere. Helium and nitrogen were used as diluents. The flight profile lasted about 13 hr and consisted of denitrogenation, a simulated Gemini phase, a transfer EVA phase, a simulated orbital laboratory phase, and a work EVA phase. A number of cases of bends occurred, of varying severity. It appears that, once precipitated, "nitrogen bends" and "helium bends" are similar. F.R.L.

A66-32150

DEVELOPMENT OF A STANDARD PROLONGED WORK TEST FOR THE EVALUATION OF FATIGUE AND STRESS IN MAN.

J. Shapira, D. R. Young, B. Datnow, and R. Pelligra (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 50, 51. Abridged.

Development of a standard work regime consisting of walking on a treadmill at an elevation and speed that requires about 33% of an individual's maximal work capacity and which can be endured without untoward effects for prolonged periods. It was found that such a regime could be well tolerated in human male subjects for up to 24 hr. Arrhythmia is a contraindication to such a test, whereas

A66-32151

depression of the ST segment of the ECG is not. Only after about 9 hr do blood values for glucose and free fatty acids attain equilibrium values. The reserve of carbohydrate in the body appears to be greater than previously suspected. Utilization of large amounts of reserve fat, as reflected by high serum values for free fatty acids and rapid turnover of injected radioactive palmitic acid, is not detrimental. Reduction of serum glucose to very low levels by the injection of insulin did not hinder the ability to continue work. F.R.L.

A66-32151

DEVELOPMENT OF TECHNIQUES FOR EVALUATING THE PHYSIOLOGICAL PROTECTIVE EFFICIENCY OF CIVIL AVIATION OXYGEN EQUIPMENT.

Ernest B. McFadden (Federal Aviation Agency, Aeromedical Service Civil Aeromedical Research Institute, Oklahoma City, Okla.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 52, 53. Abridged.

Discussion of oxygen systems and masks for crew members and passengers in high-altitude aircraft. Because of possibilities of decompression, systems must be capable of providing oxygen concentrations approaching 100%. Continuous-flow reservoir masks for passengers and crew are described and evaluated. Mask performance was determined alternatively by inspired tracheal oxygen partial pressure or oximetry. The importance of human evaluation and testing of new mask designs at altitude is emphasized.

F.R.L.

A66-32152

DISSOCIATION OF HEAT PRODUCTION AND HEAT LOSS DURING CHANGING ACTIVITY.

Paul Webb (Webb Associates, Yellow Springs, Ohio).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 58, 59. Abridged.

Study of the control operation of a portable life support system (PLSS) worn by an active astronaut in a full pressure suit outside the space vehicle. Ideally, this operation is a close match between the dynamic responses of the PLSS and the metabolic behavior of the man. If a PLSS is to respond correctly to the man's changing needs for heat dissipation, it must be able to anticipate the need in order to avoid uncomfortable and dangerous heat storage or heat deficit. Experiments were made with a subject dressed in a water cooling garment, insulating quilted underwear, an impermeable suit enclosure of rubberized silk, and an outer insulating layer of 3/8-in. polyurethane foam. The subject worked by marching on a treadmill. It was found that heat production is dissociated in time from heat loss. The time constants for these two functions are quite different.

F.R.L.

A66-32153

DISTRIBUTION OF PULMONARY BLOOD FLOW UNDER FORWARD (+G_x) ACCELERATIONS - THE HUMAN CENTRIFUGE AND RADIO-ISOTOPE SCANNING AS TANDEM TECHNIQUES TO STUDY PULMONARY PHYSIOLOGY.

Elihu York, Frederic G. Hoppin, Jr. (U.S. Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.), David E. Kuhl, and Richard W. Hyde (Pennsylvania University, School of Medicine, Philadelphia, Pa.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 60, 61. 12 refs. Abridged.

Study of the distribution of blood flow in the pulmonary vascular bed during forward acceleration at levels of +4 and +8 g_x by scanning the lungs of three normal subjects following intravenous injection of radioactive-iodinated macroaggregated human serum albumin. Results suggest that no measurable blood flow abnormality is encountered under such levels of forward acceleration.

F.R.L.

A66-32154

DYNAMIC RESPONSE OF THE HUMAN BODY TO VIBRATION WHEN COMBINED WITH VARIOUS MAGNITUDES OF LINEAR ACCELERATION.

Hubert C. Vykukal (NASA, Ames Research Center, Moffett Field, Calif.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 63, 64. Abridged.

Study to determine whether there are significant changes in the dynamic characteristics of the human body when immersed in a compound acceleration environment. Four subjects were exposed to vibration combined with linear accelerations of 1, 2-1/2, and 4 g. The mechanical impedance of each subject (semisupine position) was measured. The equipment and instrumentation are described. At 2-1/2 and 4 g the subject became dramatically aware of local resonances, such as in the abdomen, chest, and extremities. Visual decrements were also noted. The correlation of resonance measurements and subjective impressions is considered to be quite significant.

F.R.L.

A66-32155

THE EFFECT OF BLUR AND SIZE ON TARGET RECOGNITION.

C. S. Hoffman and C. P. Greening (North American Aviation, Inc., Autonetics Div., Anaheim, Calif.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 69, 70. Abridged.

Attempt to determine how much smear can be present on a display before target recognition performance is materially degraded for various target sizes. Smear or blur results when the scene being viewed is moving relative to a television or motion picture camera. The simulated display resulted from moving a camera laterally, with its line of sight perpendicular to a flat target field. Therefore, all angular rates within the field of view were uniform. Eighteen subjects viewed the films, and attempted to match up one of six display targets with one of six pictures of the targets in a book. An analysis of the data showed that an interaction between angular velocity and distance of the camera from the targets existed. This interaction suggested that there is a combined value of the two variables beyond which performance becomes markedly degraded.

F.R.L.

A66-32156

EFFECTS OF ELECTROMAGNETIC RADIATIONS ON PHYSIOLOGIC RESPONSES.

Sol M. Michaelson, R. A. E. Thomson, and William J. Quinlan, Jr. (Rochester University, School of Medicine and Dentistry, Dept. of Radiation Biology and Biophysics, Rochester, N.Y.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 71, 72. 9 refs. Abridged.

Contract No. AF 30(602)-2248; AEC Contract No. W-7401-eng-49.
Study of the biological effects of 1240-Mc pulsed microwaves on dogs, in the course of which evidence of altered physiologic function was obtained. Exposures were at 50 mw/cm² field intensity for six hours a day for five consecutive days. In addition, one dog received 10 and another, 23 daily exposures, and two dogs received a single six-hour exposure. Investigations were also made of the response of X-irradiated animals to microwaves. In general, the studies indicate that repeated exposure to microwaves can produce functional changes in dogs which, if extrapolated to man, could result in homokinetic insufficiency and decrements in performance capability even though overt incapacitation may not take place.

F.R.L.

A66-32157

EFFECT OF HYDRAZINE ON CARBOHYDRATE METABOLISM IN VIVO AND IN VITRO.

Sidney R. Fortney (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 73, 74. Abridged.

Experimental demonstration that one of the earliest effects observed after hydrazine injection, in addition to previously observed effects on blood glucose, is elevation of arterial lactate and pyruvate. The levels of these carbohydrate intermediates increased five- to tenfold within one hour after injection. The data from a fasted anesthetized dog are tabulated, and are discussed. The effect of hydrazine on oxidative phosphorylation in rat liver mitochondria was studied and the results tabulated. It was found that hydrazine markedly inhibited oxygen consumption when both pyruvate and α -ketoglutarate were substrates. An investigation in vitro was made of the effect of hydrazine on mitochondrial glutamic-oxaloacetic transaminase (GOT). GOT activity in rat liver mitochondria was found to be very susceptible to hydrazine, with marked inhibition at 1/10 the concentration needed to inhibit oxygen consumption.

F.R.L.

A66-32158 #**EFFECTS OF HYDRAZINE ON HEAT BALANCE AND SOURCE OF METABOLIC ENERGY.**

Harold L. Bitter, David L. Trout, and William W. Lackey (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 75, 76. Abridged.

Use of calorimetric methods to investigate the effects of hydrazine on metabolism and heat balance and specifically on the rate of protein catabolism, in vivo, especially under conditions in which alternate substrate for metabolism is limited. The main parameters studied are respiratory quotient (RQ), metabolic rate, the size of the carbohydrate pool, and heat losses. Animals used were two-day fasted male rats which had used up most of their liver glycogen. It was found that hydrazine alone does not appreciably alter metabolic rate or heat balance, except at high dosages. However, if the carbohydrate stores are decreased by fasting, and the mobilization of free fatty acids is limited by nicotinic acid, the metabolic rate is reduced and the heat balance altered, even at relatively low doses.

F.R.L.

A66-32159 #**THE EFFECT OF MONOMETHYLHYDRAZINE ON METHEMOGLOBIN PRODUCTION IN-VITRO AND IN-VIVO.**

Sidney R. Fortney and Dale A. Clark (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiological Chemistry Section, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 78, 79. Abridged.

Extension of previous studies which investigated mechanisms by which hydrazine derivatives exert their toxic effects to studies of dogs treated with other hydrazine derivatives. Data were obtained showing that monomethylhydrazine is quite effective in producing methemoglobin both in vitro and in vivo. In addition, incubation of monomethylhydrazine with hemoglobin produced an unidentified pigment, the absorption spectrum of which has been obtained. A possible role of methemoglobinemia in the toxicity of monomethylhydrazine is suggested by a comparison of the known metabolic effects of hydrazine derivatives.

F.R.L.

A66-32160 #**THE EFFECT OF SIMULATED SPACE CONDITIONS INCLUDING DIET UPON THE MICROBIAL PROFILES OF TWENTY SUBJECTS.**

Phyllis E. Riely (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.) and Alton E. Prince (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 80, 81. Abridged.

NASA-supported research; Contract No. AF 33(615)-1814.

Study to define the effects of space simulation on the indigenous flora of 14 body areas of 20 healthy young men, using an extensive sampling schedule. The microbial profiles of the subjects were altered both qualitatively and quantitatively during a four-week period in a simulator when no bathing was permitted. The levels of the different numbers of the flora built up for approximately 23 days, then plateaued, probably indicating that the food supply could no longer support an additional population. The data resulting from over 950,000 cultures indicate that carefully screened (microbiologically) men can safely go unwashed for a period of six weeks while living together in close confinement, and for that period of time changes in fecal flora did not produce medical symptoms.

F.R.L.

A66-32161 #**EFFECTS OF TRANSVERSE ACCELERATION ON MEMORY TASK PERFORMANCE.**

Randall M. Chambers (U.S. Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.) and Bruce M. Ross (Catholic University of America, Dept. of Psychology and Psychiatry, Washington, D.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 86, 87. 5 refs. Abridged.

Study of abstract higher mental functioning (immediate memory) of a human operator during exposure to transverse acceleration stress. Using the human centrifuge and immediate memory performance tasks, two experiments were performed to test the hypothesis that degradation in memory would occur. In the first experiment, the magnitude of acceleration stress was kept constant while volunteer subjects performed running matching memory tasks which varied in complexity. In the second experiment the running matching memory task was kept constant while the magnitude of transverse acceleration was varied. It was found that degradation did occur as a function of the acceleration stress.

F.R.L.

A66-32162 #**EVALUATION OF PILOTING PERFORMANCE IN FIXED WING AIRCRAFT.**

Jack J. Eggspuehler, Ralph Gerke, and Charles E. Billings (Ohio State University, Dept. of Aviation and Dept. of Preventive Medicine, Columbus, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 88, 89. Abridged.

Discussion of a possible method of evaluating pilot performance by analysis of his control of aircraft attitude. The criteria for measures of performance were objectivity, quantitative assessment, relevance or appropriateness, and safety. Analysis of the attitude control task was chosen because the task is critical and reproducible. An experimental model is described where it is hypothesized that certain patterns would be discernible in pilot responses to pitching or rolling moments induced by atmospheric turbulence. It is intended to implement the method with a Cessna O-1A aircraft equipped with four linear accelerators mounted within the fuselage at points equidistant from the center of gravity. Potentiometers are to be used to measure aileron and elevator control movements.

F.R.L.

A66-32163 #**EVALUATION OF PILOTING PERFORMANCE IN ROTARY WING AIRCRAFT.**

A66-32165

Charles E. Billings, Jack J. Eggspuehler, and Ralph Gerke (Ohio State University, Dept. of Aviation and Dept. of Preventive Medicine Columbus, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 90, 91. Abridged.

Description of techniques developed in an effort to delineate an objective, quantitative method of assessing pilot performance in rotary wing aircraft. An analysis of the variables involved in helicopter flying suggested that of the functions which could be isolated, rotor rotational velocity was the most critical to safe operation in all flight regimes. It was hypothesized that fatigue would cause the pilot to control rpm less precisely, and that the number and magnitude of control inputs would change in the course of long, fatiguing missions. An experiment was performed with a Hiller 12-E utility helicopter, and with four pilots with varying degrees of rotorcraft experience. The helicopter was instrumented to allow monitoring of rotor rpm and of control positions, the outputs being recorded. Results indicate that the method provides a way of evaluating how well the pilot is coping with his environment.

F. R. L.

A66-32165

EXPOSURE OF MEN TO INTERMITTENT PHOTIC STIMULATION UNDER SIMULATED IFR CONDITIONS.

C. E. Melton, E. Arnold Higgins, J. T. Saldivar, and Marlene Wicks (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 96, 97. Abridged.

Attempt to determine whether or not a group of normal men showed any electroencephalographic changes during and following photic stimulation as it might occur in flight. EEG experiments were carried out with ten volunteer men who had no history of seizure or syncope, using a Beechcraft Bonanza cockpit that was situated in an environmental chamber. The experiments involved a Grimes red rotating beacon, an Air Guard anticollision strobe light, and propeller flicker, and were performed with and without simulated fog. In general, the results indicated that the primary response to flashing lights is drowsiness. The commonest complaint of pilots about anticollision lights is annoyance. A striking feature of these experiments was a peculiar pacing of the alpha rhythm by the strobe light.

F. R. L.

A66-32166

HUMAN FACTORS IN B-58 ACCIDENTS.

William H. King (USAF, Office of the Surgeon, Barksdale AFB, La.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 107, 108. Abridged.

Discussion of accidents involving B-58 aircraft in terms of human factors, which in turn may have been affected by the characteristics of the aircraft and its equipment. Of ten landing accidents, six occurred at night, a possible contributing cause being the nose-high attitude at which the runway must initially be contacted. The question of pilot fatigue in night landing accidents after lengthy missions is examined. Attention is given to crew member capability for successful egress and survival in an emergency situation. Ballistic and rocket ejection seats are evaluated, and the need for a capsule with "zero-zero" ejection capability is emphasized.

F. R. L.

A66-32167

THE IN-VIVO INACTIVATION OF FACTOR VIII (ANTIHEMOPHILIC GLOBULIN) BY HYDRAZINE - ITS RELATION TO THE FIBRINOLYTIC MECHANISM.

J. D. Bairrington (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiological Chemistry Section, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 113, 114. 18 refs. Abridged.

Experimental study of the effect of a 0.6 LD/50 (40 mg/kg) intraperitoneal dose of hydrazine on the coagulation mechanism in rats, comparing results with those obtained in saline-injected controls. The effects were evaluated by the prothrombin time, partial thromboplastin time (PTT), thromboplastin generation test (TGT), factor VIII assay, factor IX assay, factor XIII stability test, and quantitative studies of the fibrinolytic mechanism. Results indicate that the relative in vivo toxicity of hydrazine seems to be very great; the implications of hydrazine intoxication in workers with modern propellants are obviously of clinical significance.

F. R. L.

A66-32168

LACK OF RESPONSE TO THERMAL STIMULATION OF THE SEMI-CIRCULAR CANALS IN THE WEIGHTLESS PHASE OF PARABOLIC FLIGHT.

R. S. Kellogg (USAF, Washington, D.C.) and A. Graybiel (U.S. Navy, Washington, D.C.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 119, 120. Abridged.

Investigation to test Barany's hypothesis concerning the caloric nystagmus reaction and to clarify the mechanism by use of a zero-gravity environment. Eight subjects were given caloric stimulation with ice water injected into the external ear canal. Tests were made in the laboratory and in the KC-135 zero-gravity aircraft. The subjects were tilted back 60° so as to bring the horizontal canal into vertical alignment with gravity. During stimulation, oscilloscope recordings, experimenter observations, and subjective observations from the subject were made. In all subjects, zero gravity completely suppressed caloric nystagmus. This is considered to be strong evidence supporting Barany's theory that caloric nystagmus is a function of changing gravity fields acting on the endolymph.

F. R. L.

A66-32169

LYSOSOMAL ENZYMES IN RATS EXPOSED TO 100 PER CENT OXYGEN.

D. B. Menzel, S. A. Lee, A. M. Shaw, J. Miquel, and G. A. Brooksby (California, University, Dept. of Nutritional Sciences, Berkeley; NASA, Ames Research Center, Moffett Field, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 121, 122. 10 refs. Abridged.

Investigation in rats of the effect of pure oxygen on the lysosome in view of the possibility of accelerated in vivo lipid peroxidation in animals exposed to 100% oxygen. It was considered that because of its single membrane the lysosome should be particularly susceptible to disruption by lipid peroxidation, an event which would have disastrous consequences for the cell. The rats were exposed to 100% oxygen at 600 and 760 mm Hg for varying lengths of time, and examinations were made of the effects on brain, liver, and lung. Comparison was made with control rats breathing air. The results, which were variable for different organs, are tabulated and discussed.

F. R. L.

A66-32173

A NEW NON-REBREATHING VALVE SYSTEM AND SQUEEZE-BAG RESUSCITATOR FOR EMERGENCY UTILIZATION.

John Q. Durfey (Baylor University, College of Medicine, Div. of Anesthesiology, Houston, Tex.) and Henry Seeler (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 138, 139. Abridged.

Description of a new resuscitative device combining a non-rebreathing valve of simple design and a unique squeeze bag which has a number of advantages over existing similar equipment, especially those of ease of assembly and sterilization. It is hoped that the device will be marketable at a reasonable price, thus filling a large gap in the present shortage of such equipment. F.R.L.

A66-32174

OXYGEN CONSUMPTION OF RABBITS BREATHING GAS MIXTURES CONTAINING NITROGEN, ARGON AND HELIUM, AS DILUENTS AT ATMOSPHERIC, HYPERBARIC AND HYPOBARIC PRESSURES.

R. D. Galvin, G. A. Albright, and D. J. Peeler (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 140, 141. 9 refs. Abridged.

Investigation to test the hypothesis that oxygen consumption rates in intact animals are depressed in proportion to the concentration of inert gas dissolved in the tissues. The dissolved inert gas concentrations were varied by using helium, nitrogen, and argon as diluents at atmospheric pressures. Young adult rabbits of both sexes were used in the studies. The data establish that the 24-hr oxygen consumption rates were higher in the helium atmospheres than in the nitrogen atmospheres. The oxygen consumption rates in the argon atmospheres were lower than the control rates. A comparison of the consumption rates supports the initial hypothesis.

F.R.L.

A66-32175

OXYGEN RECLAMATION FOR MANNED SPACECRAFT.

D. C. Popma (NASA, Langley Research Center, Hampton, Va.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 142, 143. Abridged.

Comparison of the most practical oxygen reclamation systems for future manned space vehicles. The methods used in the comparison and the penalties attached to these systems are examined. The weight-time characteristics of stored and nonregenerative systems are investigated. A relatively new system, the molten carbonate system, is discussed in some detail, and the merits and difficulties inherent in this technique are outlined.

F.R.L.

A66-32176

PARASYMPATHETIC CONTROL OF HEART RATE IN ACCELERATIVELY STRESSED MONKEYS.

Jeffrey S. Life and Bruce W. Pinc (Space/Defense Corp., Birmingham, Mich.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 144, 145. Abridged.

Attempt to determine whether, in the case of squirrel monkeys experiencing high g forces ($200 + g_x$) for extended periods of time (200 sec), the parasympathetic supply to the heart is implicated in producing bradycardia or arrest. Atropine sulfate (0.5 mg/kg), a postganglionic cholinergic blocking agent, was used, thereby pharmacologically interrupting the parasympathetic supply to the heart. By continuously monitoring the electrocardiogram both before, during, and after the run, it was possible to determine heart rate and to observe electrocardiographic changes. It was found that the

primate heart demonstrates an initial high parasympathetic tone resulting in bradycardia and/or cardiac arrest. The atropine sulfate eliminates this response. The initial parasympathetic discharge is replaced or removed by intrinsic or extrinsic factors after 50 sec of centrifugation, resulting in a heart rate that is significantly below precentrifugation rates but not significantly different from the rates observed in the atropinized group during this same period. F.R.L.

A66-32177

PATTERNS OF VESTIBULAR NEURONAL RESPONSE TO ROTATION OF THE LINEAR ACCELERATION VECTOR.

G. Melvill Jones and J. H. Milsum (McGill University, Dept. of Physiology, Medical Research Unit and Dept. of Electrical Engineering, Montreal, Canada).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 146, 147. Abridged.

Defence Research Board of Canada Grant No. 9910-37.

Investigation of patterns of vestibular neuronal response to rotating linear acceleration vectors, with reference to the observation that a rotating g vector can apparently, of itself, generate compensatory ocular nystagmus in the appropriate plane. Experiments were performed on decerebrate or lightly anesthetized cats. It was found that well defined patterns of information about rotating linear acceleration vectors are available from primarily acceleration-sensitive units in the CNS.

F.R.L.

A66-32178

POTENTIAL USES OF LOWER BODY NEGATIVE PRESSURE AS AN ANTI-DECONDITIONING MEASURE DURING WEIGHTLESSNESS.

Paul M. Stevens, Theodore N. Lynch, Charles A. Gilbert, Robert L. Johnson, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 160, 161. Abridged.

Study of the influence of lower body negative pressure (LBNP) on blood volume and orthostatic tolerance during varying periods of prolonged bed rest. It was found that prolonged bed rest at ground level and at altitude is associated with a loss in plasma volume and a decrease in orthostatic tolerance. Altitude per se serves only to prevent the apparent decrease in red cell mass noted during bed rest at ground level. LBNP used throughout a period of bed rest prevents the loss in plasma volume and maintains orthostatic tolerance.

F.R.L.

A66-32179

PREDOMINANT DIRECTION OF GAZE DURING SLOW HEAD ROTATION.

S. Mishkin and G. Melvill Jones (McGill University, Dept. of Physiology, Aviation Medical Research Unit, Montreal, Canada).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 162, 163. Abridged.

Defence Research Board of Canada Grant No. 9310-92.

Experimental investigation of the direction of gaze during slow patterns of head movement such as occur while appraising the general features of a wide visual scene. Previous experiments demonstrated that when the head is rotated rapidly, the quick saccadic component of consequent oculomotor response tends to predominate, carrying the eye through a large angle in advance of the head, and in effect prepositioning the direction of gaze at which the subsequent slow compensatory phase of response will occur. Results showed that during slow head rotation, as with rapid head rotation, there is a general tendency for the direction of gaze to lead the head movement, with the particular observation that, at least when the latter is sinusoidal, the magnitude of lead becomes directly related to the angular velocity at which the head is turning.

F.R.L.

A66-32180

A66-32180 # PREVENTION OF CARDIOVASCULAR DECONDITIONING BY 9- ALPHA-FLUOROHYDROCORTISONE.

William M. Smith, Kenneth H. Hyatt, and Leonid G. Kamenetsky (U.S. Public Health Service Hospital, Cardiopulmonary Laboratory, San Francisco, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 166, 167. Abridged.

Experimental study of 9- α -fluorohydrocortisone as a means of preventing the orthostatic intolerance of weightlessness. Normal male subjects subjected to 14 days of complete bed rest developed cardiovascular deconditioning. The prime manifestation of this change was the exaggerated cardioacceleration seen during tilting. It appears that vascular reflexes are inadequate to sustain peripheral resistance. In most cases marked vagotonia supersedes earlier adrenergic effects, and vasodepressor syncope follows. In this study, 9- α -fluorohydrocortisone appears to have been effective in preventing the occurrence of vasodepressor syncope. F.R.L.

A66-32181 # PROLIFERATIVE PULMONARY LESIONS IN MONKEYS EXPOSED TO HIGH CONCENTRATIONS OF OXYGEN.

F. R. Robinson, David T. Harper, Jr., Anthony A. Thomas, and Harold P. Kaplan (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 170, 171. 6 refs. Abridged.

Experimental study of the response of the lungs of monkeys to high concentrations of oxygen for periods up to 17 days at pressures from 600 to 760 mm Hg. Subacute proliferative lesions were predominant, and were seen at all levels studied, the degree being directly related to time-dose exposures. In the high dose ranges, clinical signs of illness were evident after 5 to 7 days exposure, when the monkeys became listless and anorectic. Grossly, the heavy lungs had a gray, bloodless appearance. Microscopically, there was extreme proliferation of the interstitium and alveolar epithelium. None of the monkeys died that were exposed at 600 mm Hg, although mild focal proliferative changes were seen. F.R.L.

A66-32182 # PROJECTED WINDSHIELD DISPLAYS FOR AIRCRAFT.

H. F. Huddleston (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 172, 173. Abridged.

Description of a series of fixed-base aircraft simulator experiments, evaluating possible changes in display element geometry in a British director display. Three sequential experiments were designed, using a simulator which represented a single-seat advanced cockpit in which the pilot relied on the windshield display as his primary information source. In all three phases there were significant and persistent performance and opinion differences between pilots; these differences are discussed. F.R.L.

A66-32183 # PROLONGED RECORDING FROM SINGLE VESTIBULAR UNITS IN THE FROG DURING PLANE AND SPACE FLIGHTS - ITS SIGNIFI- CANCE AND TECHNIQUES.

T. Gualtierotti and D. S. Alltucker (NASA, Ames Research Center, Moffett Field, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 174, 175. Abridged.

Study of how the gravitoceptors of the vestibular apparatus, long adapted to a 1-g environment, will respond when the gravity environment is radically changed. Conditions are described under which microwave recording from single VIII nerve fibers of frogs was possible during high acceleration and vibration. A life supporting system was built for a space experiment capable of both assuring the survival of two fully instrumented and paralyzed bullfrogs for up to six days, and applying an acceleratory stimulus of fixed parameters to the otolith unit involved. Interpretation problems are discussed. F.R.L.

A66-32184 # QUANTIFICATION OF SITUATIONAL VARIABLES IN OPERATOR- CONTROL PERFORMANCE.

C. T. Ware, Jr. (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 180, 181. 9 refs. Abridged.

Description of a method of identifying situational variables which affect system performance and of applying quantitative techniques to achieve system success. Emphasis is placed on description of physiological and psychological "stressful" elements as active forces on the man resulting in fatigue. It is concluded that in operator-control tasks where, for example, the attention of the operator is confined for long periods; where he operates under duress of complicated calculations and fear of making a mistake; where inter-personnel relationships are demoralizing; and, specifically, where situational variables can produce a high probability of successful performance, quantitative values are definable. F.R.L.

A66-32185 # RADIATION MONITORING ON GEMINI MISSIONS 4 AND 5.

Hermann J. Schaefer and Jeremiah J. Sullivan (U.S. Naval Aerospace Medical Institute, Pensacola, Fla.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 182, 183. Abridged.

Discussion of results obtained from packs of passive radiation sensors carried by the astronauts on the Gemini 4 and 5 missions. On mission Gemini 4, additional packs were flown in stationary aluminum containers. By microscopic track and grain counting of the track population in the emulsions, the proton energy spectrum of the flux penetrating a pack was determined. The configuration of the proton energy indicates that the local dose level varies by a factor at least as high as 1.6. F.R.L.

A66-32186 # REGENERABLE CARBON DIOXIDE SORBENTS.

F. Tepper, R. Udavcak, F. Vancheri, and K. Ball (MSA Research Corp., Callery, Pa.).

IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]

Washington, D.C., Aerospace Medical Association, 1966, p. 184, 185. Abridged.

Evaluation of regenerative sorbents that would remove CO₂ with minimal drying of the process air stream. Activated carbons, ion exchange resins, and coprecipitated gels were studied. CO₂ isotherms were generated for a number of different activated carbons at CO₂ partial pressures equivalent to that likely to be encountered in a space cabin environment. The low capacity of carbons for CO₂ suggested they would not be likely candidates. Results with coprecipitated gels were inconclusive. Ion exchange resins were found to be effective for CO₂ removal from a humid air stream. F.R.L.

A66-32187 # THE RESPONSE OF SQUIRREL MONKEYS TO HIGH ACCELERATIVE FORCES OF BRIEF DURATION.

Bruce W. Pinc and John N. Mehelas (Space/Defense Corp., Birmingham, Mich.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 189, 190. 9 refs. Abridged.

Survey of small simian response to very high g, demonstrating that the squirrel monkey is able to survive unconventionally high (up to 430 g) accelerative stress. Though the samples in each mode are not large enough for statistical proof, indications are that the G_x mode is more lethal than G_y and that there is a lethal "stress threshold" above 1×10^3 kg-g-sec. Three different lethal mechanisms seem to be present, related to the g level. F.R.L.

A66-32188

SAFETY FACTORS IN THE DESIGN OF PROTECTIVE HELMETS.
J. M. Rayne and K. R. Maslen.
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 191, 192. Abridged.

Consideration of the fundamentals of the design of aircrew helmets with a view to reconciling the requirements for protection against buffeting in normal flight and possibly some protection against head impact in crash conditions. The amount and type of forces which a helmet must resist are discussed. It is considered that with a liner of the right stiffness and hysteresis, it may be possible to design a helmet giving both crash and buffet protection. A specification for a buffet helmet is suggested. For a crash helmet, the main function must be to prevent skull fracture by efficient load spreading. It must resist penetration and abrasion and reduce the transference of angular movement to the head as far as possible. F.R.L.

A66-32189

SOME EFFECTS OF MACROFRACTIONATED GAMMA RAY IRRADIATION UPON THE RHESUS PRIMATE.
George S. Melville, Jr. (USAF, Washington, D.C.), George W. Harrison, Jr., Arnold A. McDowell, James F. Wright (U.S. Public Health Service, Washington, D.C.), W. Lynn Brown, and Gerrit L. Hekhuis (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 195, 196. Abridged.

Test of a hypothetical schedule to minimize radiation hazards to flight crews using Macaca Mulatta monkeys as subjects. Two 1.4 curie Co 60 sources delivered gamma rays at the rate of one roentgen per hour. Radiation effects were found in platelets, white blood cell count, delayed responses, bimanual coordination, and histopathology. It is considered that within the approximate limitations of interval and total dose in this program there would be little or no sequelae resulting from periodic low-level gamma radiation until several years after the fact. It is emphasized that damage is probably being inflicted and that the full extent of the radiation damage in the animals may not have been seen. F.R.L.

A66-32193

THERMAL COMFORT ZONES FOR HELIUM OXYGEN ATMOSPHERES AT REDUCED PRESSURES.
M. S. Bonura, R. E. Snyder, and W. J. White (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 210, 211. Abridged.

Discussion of a test program undertaken to evaluate the comfort zone for helium-oxygen and nitrogen-oxygen mixtures from an engineering standpoint. A total of 67 days of manned testing of advanced life support and environmental control systems was completed in the

double-walled, 4000-ft³, Douglas space cabin simulator, which contains a complete life support system for a crew of four. Comfort zone tests were conducted in a comfort simulator which was installed in the space cabin simulator. It was found that the average comfort temperature for a man wearing a summer flying suit was much higher in helium-oxygen than nitrogen-oxygen mixtures. With no clothes, the differences between the comfort temperatures at the various conditions of the experiment were not significant. F.R.L.

A66-32194

WATER VAPOR ELECTROLYSIS.
T. Wydeven and E. Smith (NASA, Ames Research Center, Moffett Field, Calif.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 224, 225. Abridged.

Discussion of a subsystem of the life support system which appears favorable for recovering breathable oxygen from expired and perspired water vapor: a water-vapor electrolysis cell. A study was undertaken in which the cell matrix is composed of sulfuric acid and silica gel. The purpose was to study the chemical and electrochemical characteristics of the matrix during extended periods of electrolysis and to determine if such a matrix could be used reliably and at a higher power efficiency than the phosphoric acid-asbestos or phosphoric acid-microporous rubber matrix. Encouraging results have been obtained regarding power and matrix reliability. F.R.L.

A66-32195

REGIONAL PULMONARY ARTERIAL VENOUS-SHUNTING DURING EXPOSURE TO TRANSVERSE ACCELERATION.

R. A. Vandenberg, A. C. Nolan, J. C. P. Williams, R. E. Sturm, and E. H. Wood (Mayo Clinic and Mayo Foundation, Mayo Graduate School of Medicine, Dept. of Physiology, Rochester, Minn.).
IN: AEROSPACE MEDICAL ASSOCIATION, ANNUAL SCIENTIFIC MEETING, 37TH, LAS VEGAS, NEV., APRIL 18-21, 1966, PRE-PRINTS. [A66-32134 17-04]
Washington, D.C., Aerospace Medical Association, 1966, p. 228, 229. Abridged.
Grant No. NSG-327; National Institutes of Health Grant No. H-3532; American Heart Association Grant No. CI-10.

Consideration of the decrease in arterial blood saturation during and after transverse acceleration, attributed to pulmonary arterial-venous shunting in dependent regions of the lungs considered to have become atelectatic as a result of the increased weight of the blood and thoracic contents relative to air. This postulate was examined in anesthetized dogs exposed to 2, 4, and 6 g acceleration in the supine (+g_x) and prone (-g_x) positions during IPP respiration with air and 99.6% oxygen, and also during spontaneous respiration with 99.6% oxygen. The site of the pulmonary arterial-venous shunt was localized to dependent regions of the lungs by comparing the oxygen saturation of the blood withdrawn continuously from superior and dependent pulmonary veins through cuvette oximeters with similarly determined blood oxygen saturation levels in the aorta. F.R.L.

A66-32196

AN INSTRUMENTAL MEASUREMENT FOR PAROTID FLOW FOR THE ANALYSIS OF FLOW RATE PATTERNS.

D. Engberg, S. Shacks, E. Pugh, and T. B. Weber (Beckman Instruments, Inc., Fullerton, Calif.).
Aerospace Medical Association, Annual Scientific Meeting, 37th, Las Vegas, Nev., Apr. 18-21, 1966, Paper, 2 p.

Use of parotid fluid as a means of monitoring stress in space-craft crew members. This body fluid lends itself to collection, measurement, and evaluation without producing stress. The purpose of the study was to verify the relationships between select biochemical variables in parotid fluid, blood, and urine under nonstress and stressful conditions. Concurrent with establishing these relationships, the necessary instrumentation to monitor instantaneous changes in parotid fluid flow rate was developed. F.R.L.

A66-32207 #
BIOMEDICAL SIGNIFICANCE OF PARTICULATE CONTAMINATION IN SPACECRAFT.

Douglas E. Busby (Lovelace Foundation, Albuquerque, N. Mex.).
American Association for Contamination Control, Annual Technical Meeting and Exhibit, 4th, Miami Beach, Fla., May 25-28, 1965.
 Paper. 7 p.
 \$0.50.

Study of the problem of particle and droplet contamination of a spacecraft cabin atmosphere from the standpoint of the space physician by attempting to define the characteristics of contaminant-astronaut contact in the weightless environment and the medical implications resulting therefrom. The sources of particle and droplet contamination, both exogenous and endogenous, are examined and the characteristics of contaminant-astronaut contact are studied. The medical implications of particle and droplet inhalation into and deposition in the respiratory passages are examined. It is concluded that, since the weightless state does not alter the high percent deposition of particles and droplets below about 0.4μ in diameter in the lower respiratory passages, the medical implications of the inhalation of contaminants of this size will not be different from the space environment as compared with the earth environment. M. F.

A66-32210 #
CONTAMINATION PROBLEMS AND THE SPACE PROGRAM.
 John E. Condon (NASA, Office of Reliability and Quality Assurance, Washington, D. C.).
American Association for Contamination Control, Annual Technical Meeting and Exhibit, 4th, Miami Beach, Fla., May 25-28, 1965.
 Paper. 6 p.
 \$0.50.

Discussion of solutions of contamination problems connected with the space program. Some of the frequent cleaning and contamination control problems experienced so far in aerospace installations are reviewed. M. M.

A66-32211 #
CONTROLLING THE HAZARDS OF BIOLOGICAL AND PARTICULATE CONTAMINATION WITHIN MANNED SPACECRAFT.
 Myron H. Bengson and Fred W. Thomae (General Electric Co., Advanced Resources and Project Operation, Bio-Sciences Operation, Valley Forge, Pa.).
American Association for Contamination Control, Annual Technical Meeting and Exhibit, 4th, Miami Beach, Fla., May 25-28, 1965.
 Paper. 13 p. 12 refs.
 \$0.50.

Review of experiments on the control of contamination in manned spacecraft. Some of the problems involved and the requirements for their solution are tabulated. The problem of biological interactions is expected to be specific for each spacecraft, and the final test of the space cabin will include provision for biologic monitoring. M. M.

A66-32229 #
THE POSSIBILITY OF BIOLOGICAL EFFECTS OF A MAGNETIC FIELD ON LIVING CELLS - PRESENT STATUS OF THE PROBLEM [SULLA POSSIBILITA DI EFFETTI BIOLOGICI DEL CAMPO MAGNETICO A LIVELLO CELLULARE - STATO ATTUALE DEL PROBLEMA].
 M. Lenzi (Modena, Università, Istituto di Radiologia, Modena, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Jan.-Mar. 1966, p. 24-44. 51 refs. In Italian.

Demonstration of possible effects of magnetic fields on the production and metabolism of normal and diseased mammalian cells investigated in vivo and in vitro. Experimental data published in the literature as well as the results obtained by the author seem to point to the existence of these effects. The need for further research, considering the special problems of space biology, is emphasized. M. M.

A66-32230 #
BEHAVIOR OF THE ECG P WAVE RELATED TO CHANGES IN THE BODY TILT IN SPACE OF RABBITS DEPRIVED OF AFFERENT IMPULSES FROM PRESSURE-RECEPTIVE AREAS [COMPORTAMENTO DELL'ONDA P DELL'ECG IN RAPPORTO ALLE VARIAZIONI DI POSIZIONE DEL CORPO NELLO SPAZIO NEL CONIGLIO DEAFFERENTATO DELLE ZONE PRESSOCETTRICI].
 C. Vacca, L. Vacca, and A. Aurucci.
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Jan.-Mar. 1966, p. 45-60. In Italian.

Experimental investigation of changes in the ECG P wave in rabbits tilted on a table from 0° to $+65^\circ$ and to -65° , equal to 0 , $+0.75 G_z$, $-0.75 G_z$, in relation to heart axis changes due to different body positions in space. The investigation was performed before and after surgical suppression of afferent impulses from pressure-receptive vascular areas. After the suppression, the P wave did not show changes, regardless of changes in the heart electric axis. The P wave changes previously observed in young men especially in the $+65^\circ$ position of the tilt table, are connected with: (1) different summation vector of atrial voltages due to anatomical changes in the heart axis, related to body tilting; and (2) vascular reflexes arising from pressure-receptive areas. M. M.

A66-32231 #
BEHAVIOR OF THE SENSE OF LIGHT AT DIFFERENT LEVELS OF HYPOXIA [COMPORTAMENTO DEL SENSO LUMINOSO A VARI GRADI D'IPOSSIA].
 R. Neuschuler, C. Terrana, and M. Stirpe.
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Jan.-Mar. 1966, p. 61-68. 19 refs. In Italian.

Experimental investigation of the sense of light at simulated altitudes of 4,100 and 5,500 meters above sea level obtained by means of low oxygen mixtures. Contrary to the results obtained by other authors, a significant decrease in the values of retinal adjustment was found only at the highest altitude, while the decrease was insignificant and uncertain at the intermediate altitudes. M. M.

A66-32232 #
USE OF ACETYL-ASPARTIC ACID AND CITRULLINE IN THE TREATMENT AND PREVENTION OF FLIGHT FATIGUE [SULL'IMPIEGO DELL'ACIDO ACETIL-ASPARTICO E DELLA CITRULLINA NEL TRATTAMENTO E NELLA PREVENZIONE DELLA FATICA DA VOLO].
 G. Rotondo and A. M. De Angelis.
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Jan.-Mar. 1966, p. 85-105. 21 refs. In Italian.

Experimental investigation of the possible oral administration of acetyl-L-aspartic acid and L-citrulline in the treatment and prevention of flight fatigue, performed on 40 military jet pilots. The results obtained included the definite improvement of both the fatigue symptoms and of professional proficiency, together with a clear and constant improvement in the quickness and regularity of the reaction time to acoustic and visual stimuli. The possible physiological and pharmacological activity of these drugs in bringing about favorable results in the treatment of flight fatigue are reviewed. M. M.

A66-32233 #
PURITY CONTROL OF LIQUID OXYGEN FOR ON-BOARD BREATHING EQUIPMENT BY MEANS OF IR ABSORPTION SPECTROPHOTOMETRY. I [CONTROLLO DELLA PUREZZA DELL'OSSIGENO LIQUIDO PER RESPIRATORI DI BORDO CON LA SPETTROFOTOMETRIA DI ASSORBIMENTO NELL'INFRAROSSO. I].
 C. Marangoni and A. Giusti.
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Jan.-Mar. 1966, p. 106-115. In Italian.

Evaluation of the methods of gas chromatography and of IR absorption spectrophotometry for determining the purity of the liquid oxygen used in airmen's breathing apparatus. Spectrophotometry was found to be more suitable due to the small amounts of impurities possibly present and the maximum permissible limits of the specifications. It is pointed out that the IR spectrophotometer equipped with a gas cell with a 10-m path can meter a few ppm of contaminants with satisfactory accuracy. M. M.

A66-32305 #**ACTIVATION OF THE PITUITARY-ADRENAL AXIS DURING RAPID EYE MOVEMENT SLEEP IN MAN.**

M. P. Mandell, A. J. Mandell, R. T. Rubin, P. Brill, J. Rodnick, R. Sheff, and B. Chaffey (California, University, Center for Health Sciences, Biochemical Correlates Laboratory, Dept. of Psychiatry, and Dept. of Urology; Brentwood Veterans Administration Hospital, Los Angeles, Calif.).

Life Sciences, vol. 5, no. 7, 1966, p. 583-587. 11 refs. Grant No. NSG-237-62.

Demonstration that catheterized urology patients were shown to have increases in urinary 17-hydroxycorticoids regularly associated with rapid eye movement sleep (REMS) epochs when they were studied electrophysiologically all night. Their urinary catheter output was connected to a volume-driven fraction collector. The findings indicate that REMS more resembles the waking state than slow sleep.

F.R.L.

A66-32308**COMPLETE FRACTIONATION OF BACTERIOCHLOROPHYLL AND ITS DEGRADATION PRODUCTS.**

W. S. Kim (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

Biochimica et Biophysica Acta, vol. 112, 1966, p. 392-402. 16 refs.

Description of two rapid methods for complete separation of bacteriochlorophyll and its degradation products, using small amount (approximately 100 mg) of *Rhodospirillum rubrum*. Absorption coefficients of the bacteriochlorophyll fractions were calculated from an accurate and sensitive fluorometric analysis of Mg, and the physical values were compared with previously published results. Fluorescence, phase test, and HCl numbers studied with each component are presented. After chemical and photo-oxidation, several bands of green pigments and other degradation products were produced. The physical data obtained from the green pigments were quite similar. The possible production sequence of these oxidized products is described. The fast-migrating gray-green fraction showed a diminishing γ -band at 280 m μ with less prominent Soret and red bands.

F.R.L.

A66-32366**SERUM GLUCOSE AND FREE FATTY ACIDS IN MAN DURING PROLONGED EXERCISE.**

D. R. Young, R. Pelligra, and R. R. Adachi (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).

Journal of Applied Physiology, vol. 21, May 1966, p. 1047-1052. 30 refs.

Description of studies of postabsorptive energy metabolism under two levels of physical activity (resting or treadmill walking) for periods of up to 24 hr. During resting conditions, the serum glucose at first declined and then stabilized at a level of 73 mg/100 ml. The level of serum free fatty acids (FFA) reached a steady-state level of 1.1 meq/liter. Similar trends occurred during treadmill walking, but they differed in magnitude. During work, the level of serum glucose declined to 66 mg/100 ml and thereafter remained constant; serum FFA reached a constant level of 2.4 meq/liter. The RQ, serum lactate, serum nonprotein nitrogen, and urinary nitrogen were similar during both test conditions. Under the conditions of the experiment a constant rate of influx and extraction of glucose as well as FFA from the blood was attained.

D.H.

A66-32552**MEDIAL FOREBRAIN BUNDLE-LATERAL HYPOTHALAMIC AREA AND REINFORCING BRAIN STIMULATION.**

Elliott S. Valenstein and James F. Campbell (Fels Research Institute, Dept. of Psychophysiology-Neurophysiology, Yellow Springs, Ohio). *American Journal of Physiology*, vol. 210, Feb. 1966, p. 270-274. 20 refs.

National Institutes of Health Grant No. M-4529; Grant No. NSG-437.

Self-stimulation performance was studied in animals, with electrodes in septal or olfactory areas, after extensive lesions of the medial forebrain bundle (MFB). With many animals the lesions were quite large, involving a major portion of a cross-sectional area of the MFB. Taking the animals as a group, the entire area of the MFB was destroyed at all frontal planes extending through the

preoptic area, the anterior-posterior hypothalamus, and the ventral tegmental area of Tsai. With a sufficient postoperative recovery period, no animal failed to self-stimulate. The conclusion is that considerably more redundancy or capacity for reorganization exists in the neural substrate underlying self-stimulation than was previously assumed.

(Author)

A66-32553**RIBONUCLEOSIDE TRIPHOSPHATASE IN RABBIT RETICULOCYTES.**

I. D. Raacke, J. Fiala, and S. Matsushita (Kaiser Foundation Hospitals, Kaiser Foundation Research Institute, Laboratory of Comparative Biology, Richmond, California, University, Space Sciences Laboratory, Berkeley, Calif.).

Archives of Biochemistry and Biophysics, vol. 113, Feb. 1966, p. 367-370. 10 refs.

National Institutes of Health Grant No. GM-07924-02; NSF Grant No. GB-2076; Grant No. NSG-479.

Extracts of rabbit reticulocytes contain enzymes capable of specifically releasing inorganic phosphate from all four ribonucleoside triphosphates. The activities are concentrated in the ribosomal fraction, albeit to different extents. They are firmly bound and cannot be removed by the usual washing procedures. The activities sediment in a series of well-defined peaks in a sucrose density gradient. The relative proportions of the different activities, however, are not the same in different parts of the gradient, indicating that separate enzymes are responsible for each activity. The enzymes are also activated to different extents by Mg⁺⁺, Mn⁺⁺, and Ca⁺⁺. The ATPase differs in properties from the mitochondrial enzyme and from the membrane-bound ATPase of the Na⁺ and K⁺ transport systems. The reticulocyte triphosphatases are similar to ribosome-bound enzymes present in *Escherichia coli* and pea seedlings.

(Author)

A66-32554**EARLY EFFECTS OF CORTICOSTERONE ON AMINO ACID INCORPORATION BY RAT LIVER SYSTEMS SUBSEQUENT TO ITS IN VIVO INJECTION.**

H. A. Leon (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

(Federation of American Societies for Experimental Biology, Annual Meeting, 49th, Atlantic City, N.J., Apr. 9-14, 1965, Paper.) *Endocrinology*, vol. 78, Mar. 1966, p. 481-486. 20 refs.

Fasted male rats were given a single intraperitoneal injection of corticosterone or of saline, and amino acid incorporation into liver microsomal and cell-sap protein was assayed in a cell-free system. Endogenous pyruvate kinase and added phosphoenolpyruvate served to maintain the nucleotide triphosphates at a level sufficient for prolonged incorporation. Doses of 25 or 50 μ g/kg of corticosterone were effective in stimulating incorporation. The latter dose stimulated microsomal incorporation 20% at 15 min and 118% at 30 min. Larger doses had no effect at these time intervals. This was attributed, in part, to feedback inhibition of the pituitary adrenal axis with a resultant decrease in endogenous corticosterone secretion. Stimulation with a wider range of doses occurred in adreno-demedullated rats, thus largely excluding the acute release of epinephrine as a factor. When incorporation was assayed in a system containing creatine kinase and creatine phosphate for energy regeneration, no consistent stimulation by corticosterone was observable.

(Author)

A66-32555**INFLUENCE OF AGE ON LIVER GLYCOGENESIS IN RATS EXPOSED TO ACCELERATION STRESS.**

J. Oyama, R. Medina, and W. T. Platt (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.). *Endocrinology*, vol. 78, Mar. 1966, p. 556-560. 8 refs.

Overnight-fasted rats ranging in age from 8 to 104 days were stressed by centrifugation for 2.5 or 5.0 hr at 4.7 g. Liver glycogen, plasma corticosterone, liver glycogen synthetase and plasma glucose were determined in stressed rats as a function of age and compared to noncentrifuged control rats. Significant increases in liver glycogen deposition occurred in centrifuged rats 18 days or older but not in younger rats. The unresponsiveness of

A66-32556

the younger rats was attributed to their limited ability to elaborate increased amounts of adrenal corticosterone during centrifugation. Liver glycogen synthetase was increased significantly by centrifugation in selected groups of the older animals. An increase in synthetase was not a necessary step in the observed increase in liver glycogenesis in centrifuged rats. Glucose or corticosterone, either alone or in combination, administered to normal unstressed rats had no significant effect on liver glycogen synthetase activity.

(Author)

A66-32556

DAILY CORRELATION OF ADRENAL STEROIDS AND ALPHA FREQUENCY IN THE EEG - A DEMONSTRATION.

Benjamin J. Murawski and Stephen K. Burns (Harvard University, Harvard Medical School, Dept. of Psychiatry, Medical Clinics, Peter Bent Brigham Hospital, Boston; Massachusetts Institute of Technology, Research Laboratory of Electronics, Center for Communication Sciences, Cambridge, Mass.).

Journal of Applied Physiology, vol. 21, Mar. 1966, p. 549-553. 28 refs.

National Institute of Mental Health Grant No. MH-03634; NSF Grant No. GP-2495; National Institutes of Health Grant No. MH-04737-05; Contract No. DA-36-039-AMC-03200(E); Grant No. NaG-496.

A healthy young male was studied for 22 consecutive days with daily EEG recordings and urinary adrenal steroid determinations. A method of computer analysis of alpha activity is presented and the results correlated with endogenous adrenocortical fluctuations in the same individual. Autocorrelations and cross correlations were performed on all measures. A highly significant correlation (-.62) was found with a lag of 1 day between alpha frequency and urinary 17-hydroxycorticosteroids and an equally high correlation (-.63) with 17-ketosteroids but with a 3-day lag. Finding a correlation coefficient as high as .62 between the nervous system and the adrenal is consistent with the theoretical model that the endocrine system in some respects acts independently of nervous system regulation but at the same time works in conjunction with the central nervous system.

(Author)

A66-32667

AEROSPACE LIFE SUPPORT; AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, NATIONAL MEETING, 55TH, HOUSTON, TEX., FEBRUARY 7-11, 1965; ANNUAL MEETING, 58TH, PHILADELPHIA, PA., DECEMBER 5-9, 1965.

Chemical Engineering Progress, Symposium Series, no. 63, 1966.

99 p.

Members, \$5.00; nonmembers, \$15.

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KINETICS AND CATALYST SELECTION IN THE COMBUSTION OF ATMOSPHERIC TRACE CONTAMINANTS. Richard H. Johns (Atlantic Research Corp., Alexandria, Va.), p. 81-88. 6 refs. [See A66-32680 17-05]

REGENERATIVE SEPARATION OF CARBON DIOXIDE VIA METALLIC OXIDES. G. V. Colombo and E. S. Mills (Douglas Aircraft Co., Inc., Santa Monica, Calif.), p. 89-94. [See A66-32681 17-05]

A66-32668

SPACE VEHICLE WATER RECLAMATION SYSTEMS - A STATUS REPORT.

Dan C. Popma and Vernon G. Collins (NASA, Langley Research Center, Hampton, Va.).

(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 54a.)

Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 1-9. 9 refs.

[For abstract see issue 06, page 712, Accession no. A65-15397]

A66-32669

AN APPROACH TO WATER MANAGEMENT FOR LONG DURATION MANNED SPACE FLIGHTS.

Taylor J. Linzey (North American Aviation, Inc., Downey, Calif.).

(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 54b.)

Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 10-18.

Summary of requirements for a system to supply potable water on extended space flights. A system is proposed to meet these requirements. This system is based on a three-cycle purification concept.

R. A. F.

A66-32670

CONTINUOUS ATMOSPHERE CONTROL USING A CLOSED OXYGEN CYCLE.

A. D. Babinsky and T. J. Walsh (TRW, Inc., Cleveland, Ohio).

(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 47a.)

Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 19-23.

[For abstract see issue 06, page 712, Accession no. A65-15398]

A66-32671

A FLIGHT PROTOTYPE WATER ELECTROLYSIS UNIT.

Edward J. Glanfield, Ralph A. Miller, and Fred P. Rudek (General Electric Co., Philadelphia, Pa.).

(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 47b.)

Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 24-28. 5 refs.

Description of a water electrolysis unit designed as a flight prototype to support a four-man crew for a one-year mission with 90-day resupply intervals. The unit electrolyzes 9 lb of water per day and thereby produces 8 lb of oxygen for breathing and 1 lb of hydrogen for use in a carbon dioxide reduction reaction. The unit employs ion exchange membranes in a pocket cell configuration to provide for operation of the unit in a weightless condition. The membranes provide the separation of the liquid electrolyte from the gases produced, necessary for space applications. A description of the hardware and physical characteristics is given as well as information on the performance of the unit. (Author)

A66-32673

OXYGEN REGENERATION IN A SOLID ELECTROLYTE SYSTEM.
Horace W. Chandler and Frank Z. Pollara (Isomet Corp., Palisades Park, N. J.).
(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 47d.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 38-42.
USAF-NASA-supported research.
[For abstract see issue 06, page 711, Accession no. A65-15346]

A66-32674

WATER ELECTROLYSIS WITH A HYDROGEN-DIFFUSION CATHODE.
J. E. Clifford, E. S. Kolic, and C. L. Faust (Battelle Memorial Institute, Columbus, Ohio).
(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 47f.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 43-49.
Contracts No. AF 33(616)-8431; No. AF 33(657)-10988.
[For abstract see issue 06, page 712, Accession no. A65-15394]

A66-32675

PERFORMANCE OF AN ELECTROCHEMICAL DEVICE FOR SIMULTANEOUS CARBON DIOXIDE REMOVAL AND OXYGEN GENERATION.
Daniel L. Brown, Werner Glass, and John L. Grestorex (Ionics, Inc., Watertown, Mass.).
(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 47e.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 50-54.
Contract No. NAS 9-1308.

Description of a continuous-flow, solid-state electrochemical device developed to remove carbon dioxide from a space-cabin atmosphere and to generate oxygen at the same time. Carbon dioxide is removed and concentrated by chemisorption and electro-dialysis. Oxygen is generated by water electrolysis. Performance data obtained from a four-man prototype are given. R. A. F.

A66-32676

AN INTRODUCTION TO TRACE CONTAMINANT CONTROL PROBLEMS.
Dieter D. Huber (Conductron Corp., Northridge, Calif.) and Thomas P. Jackson (Aerofjet-General Corp., Azusa, Calif.).
(American Institute of Chemical Engineers, Annual Meeting, 58th, Philadelphia, Pa., Dec. 5-9, 1965, Symposium on Trace Contaminant Control in a Closed Environment, Preprint 26a.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 55-62. 12 refs.

The problems of trace contaminant control in closed environments are defined in light of the requirement for safe air in the habitable areas of manned spacecraft. The need for knowing contaminant generation rates and the maximum allowable concentrations of contaminants for long duration continuous exposure is shown in terms of its effect on the air purification system requirements. Means for controlling trace contaminants and problems associated

with measuring the effectiveness of these methods are briefly discussed. Available and desirable techniques for detecting and monitoring trace contaminants in closed environments are delineated. A list of contaminants identified in various closed environments is included, and the relationships between important trace contaminant control parameters are shown. (Author)

A66-32677

GAS SENSORS FOR AEROSPACE.
Frank J. Briscoe (Perkin-Elmer Corp., Norwalk, Conn.).
(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 54e.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 63-69.
Contracts No. NAS 9-1191; No. NAS 9-2253; No. NAS 9-3355.
[For abstract see issue 06, page 711, Accession no. A65-15227]

A66-32678

THE APPLICATION OF MICROWAVE SPECTROSCOPY TO CONTAMINANT ANALYSIS.
William F. White (NASA, Langley Research Center, Hampton, Va.).
(American Institute of Chemical Engineers, National Meeting, 55th, Symposium on New Developments in Aerospace Life Support - Part II, Houston, Tex., Feb. 7-11, 1965, Preprint 54d.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 70-75. 5 refs.
[For abstract see issue 06, page 711, Accession no. A65-15251]

A66-32679

GASEOUS CONTAMINANT REMOVAL BY ADSORPTION.
A. J. Robell, F. G. Borgardt, and E. V. Ballou (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Research Laboratories, Palo Alto, Calif.).
(American Institute of Chemical Engineers, Annual Meeting, 58th, Philadelphia, Pa., Dec. 5-9, 1965, Symposium on Trace Contaminant Control in a Closed Environment, Preprint 26b.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 76-80. 11 refs.
Research supported by the Lockheed Independent Research Program; Contract No. NAS-93415.
[For abstract see issue 10, page 1491, Accession no. A66-21189]

A66-32680

KINETICS AND CATALYST SELECTION IN THE COMBUSTION OF ATMOSPHERIC TRACE CONTAMINANTS.
Richard H. Johns (Atlantic Research Corp., Alexandria, Va.).
(American Institute of Chemical Engineers, Annual Meeting, 58th, Philadelphia, Pa., Dec. 5-9, 1965, Symposium on Trace Contaminant Control in a Closed Environment, Preprint 26c.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 81-88. 6 refs.
USAF-sponsored research.
[For abstract see issue 10, page 1491, Accession no. A66-21190]

A66-32681

REGENERATIVE SEPARATION OF CARBON DIOXIDE VIA METALLIC OXIDES.
G. V. Colombo and E. S. Mills (Douglas Aircraft Co., Inc., Santa Monica, Calif.).
(American Institute of Chemical Engineers, Annual Meeting, 58th, Philadelphia, Pa., Dec. 5-9, 1965, Symposium on Trace Contaminant Control in a Closed Environment, Preprint 26d.)
Chemical Engineering Progress, Symposium Series, no. 63, 1966, p. 89-94.
Research supported by the Douglas Independent Research and Development Program.
[For abstract see issue 10, page 1491, Accession no. A66-21191]

A66-32686

A66-32686

COMMENTS ON PREFLIGHT TRAINING FOR GEMINI V. Charles Conrad, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.).

Society of Experimental Test Pilots, Technical Review, vol. 8, no. 1, 1966, p. 69-76.

Description of the various stages in the preflight planning and training for Gemini 5. The stages considered are those of spacecraft test, Gemini mission simulator, McDonnell Gemini simulator, experiments briefing and training, planetarium, survival and parachute training, centrifuge, launch abort, and KC-135 zero-g flight.

M. M.

A66-32831

VAN SLYKE'S BUFFER VALUES FOR CELL SECRETIONS.

Constantine Sorokin (Maryland, University, Dept. of Botany, College Park, Md.).

Protoplasma, vol. 60, no. 1, 1965, p. 79-85. 15 refs.

Grant No. NSG-70.

Experimental investigation of the buffering capacity of substances liberated by algal cells in relation to external conditions, expressed in terms of van Slyke's buffer index. Van Slyke's buffer indexes are determined for secretions of synchronized (by intermittent light) cells of the green, high-temperature alga, *Chlorella* 7-11-05. The change in pH and the value of the buffer index were found to depend on initial pH, duration of observation, and population density. The major component of the secreted buffer system was identified as bicarbonate, and the major cation, potassium.

M. L.

A66-32832

ELECTROPHYSIOLOGICAL PATTERNS AND CEREBRAL IMPEDANCE CHARACTERISTICS IN ORIENTING AND DISCRIMINATIVE BEHAVIOR.

W. R. Adey (California, University, Center for Health Sciences, Brain Research Institute, Los Angeles, Calif.).

Excerpta Medica International Congress Series, Sept. 1965, p. 324-339. 34 refs.

National Institutes of Health Grants No. NB-01883; No. MH-03708; Grants No. AF AFOSR 246-63; No. NSG-505; Contract No. NAS 9-1970.

Review of evidence of patterns in the on-going electroencephalogram (EEG) activity accompanying the performance of learned tasks not involving rhythmic environmental stimuli. Also reviewed are techniques for measuring electrical impedance in small volumes of cerebral tissue during behavioral responses in order to detect long-term changes, if any, in tissue states. Studies are discussed of the conditional processes and measurements of cerebral impedance during orientation and task performance in the cat. Some EEG correlates of altered states and conditional behavior in man are assessed. It is shown that it is necessary to consider redundant, stochastic, and nonlinear modes of operation at the level of the single neuron and in the integrated activity of neuronal populations. The possibility exists that extraneuronal compartments may participate importantly in the modulation of the wave process that characterizes intracellular records, and that these wave processes may rank at least equivalently with neuronal firing in the transaction of information, and even more importantly in its deposition and recall.

M. L.

A66-32833

ZOOSPORE INHIBITION IN SPONGIOCHLORIS TYPICA.

Robert J. McLean and Francis R. Trainor (Connecticut, University, Dept. of Botany, Storrs, Conn.).

Journal of Phycology, vol. 1, no. 2, 1965, p. 58-60. 11 refs.

Grant No. NSG-(T)-47; NSF Grant No. GB-1856.

Experimental investigation of the inhibition of zoospores of the unicellular chlorococcacean alga, *Spongiochloris typica*, by a soil bacillus. The zoospore-inhibiting effect could be found in the cell-free filtrate of the bacterial culture grown in complete medium, and could be demonstrated only when the pH was 8.4 or above. It is concluded that ammonium ion - and no other coacting ion - was necessary for inhibition.

M. L.

A66-32859

PROTEIN SPECIFICITY AND NERVOUS FUNCTIONS.

F. O. Schmitt (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.).

Shinkei Kagaku, Supplement, vol. 4, Sept. 1965, p. 91-96. 16 refs. Research supported by the Rogosin Foundation and the Louis and Eugenie Marron Foundation; National Institutes of Health Grants No. NB-00024-15; No. GM-10211-04; Grant No. NSG-462; Contracts No. Nonr-1841(27); No. Nonr (G)-00089-64.

Discussion of a point of view about the determinative role of proteins in brain functioning. Documentation is offered from published and unpublished work from laboratories, from the literature, and from the Neurosciences Research Program.

M. M.

A66-32875

HUMAN FACTORS IN THE DEVELOPMENT OF TECHNICAL PROBLEMS [DIE BERÜCKSICHTIGUNG DES MENSCHEN BEI DER ENTWICKLUNG TECHNISCHER SYSTEME].

R. Seifert.

(Arbeitsgemeinschaft für Wehrtechnik, Arbeitstagung, Bad Godesberg, West Germany, Apr. 30, 1965, Vortrag.)

Wehrtechnische Monatshefte, no. 8, 1965. 12 p. 13 refs. In German.

Review of the nature, development, and present status of the field known as human engineering, which considers the relationship of specific human functions constituting a subsystem to the system as a whole. The problem of describing human behavior in mathematical terms is considered. The effect of overload on human behavior as an operating subsystem and the opposite situation in which the human factors are restricted to a very narrow spectrum of functions are discussed. Sensitivity to an external signal or stimulus, signal recognition, and signal interpretation are examined.

D. P. F.

A66-32894

CONTAMINATION CONTROL AND THE SPACE PROGRAM.

John E. Condon (NASA, Washington, D.C.).

Contamination Control, vol. 5, Apr. 1966, p. 9, 10.

Discussion of contamination control, which has received a great stimulus from space program requirements. The objectives of an effort toward contamination control are outlined, contamination control courses offered by NASA are mentioned, and the NASA contamination control handbook is described.

B. B.

A66-32899

PROPERTIES OF DIPEPTIDYL ARYLAMIDASE I OF THE PITUITARY - CHLORIDE AND SULFHYDRYL ACTIVATION OF SERLYL-TYROSYL- β -NAPHTHYLAMIDE HYDROLYSIS.

J. Ken McDonald, Stanley Ellis, and Thomas J. Reilly (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

Journal of Biological Chemistry, vol. 241, Apr. 10, 1966, p. 1494-1501. 16 refs.

Extracts of bovine anterior pituitary tissue were found to contain enzymes which cleaved dipeptides from β -naphthylamide derivatives between pH 3 and 7. The pH optimum for the release of Ser-Tyr from Ser-Tyr- β -naphthylamide was pH 4, whereas at neutrality this substrate was hydrolyzed stepwise from the NH_2 terminus. The enzyme catalyzing the dipeptidyl cleavage of Ser-Tyr- β -naphthylamide, referred to as "dipeptidyl arylamidase I," showed an absolute requirement for Cl^- and contained -SH groups which were essential for activity. By fractionation with $(\text{NH}_4)_2\text{SO}_4$, a separate enzyme was demonstrated which cleaved Lys-Ala from Lys-Ala- β -naphthylamide. This enzyme, referred to as "dipeptidyl arylamidase II," required neither Cl^- nor -SH for activity. On the basis of chloride requirements, the pituitary enzyme hydrolyzing Ser-Tyr- β -naphthylamide at pH 4 may have been responsible for the observed cleavage of Ser-Tyr from the NH_2 -terminal decapeptide of adrenocorticotrophic hormone at pH 4. The Ser-Tyr arylamidase was distinguished from the pituitary enzyme, which cleaves Ser-Met from Ser-Met-Glu, and from the glucagon-degrading enzyme, which has similar Cl^- and -SH requirements.

(Author)

A66-32936 #

PHYSIOLOGICAL REACTIONS OF ASTRONAUTS TO OVERLOADS DURING THE FLIGHT OF THE SPACESHIP VOSKHOD [FIZIOLOGICHESKIE REAKTSII KOSMONAVTOV PRI DEISTVII PEREGRUZOK VO VREMIA POLETA NA KOSMICHESKOM KORABLE "VOSKHOD"]. A. R. Kotovskaia, N. Kh. Eshanov, R. A. Vartbaronov, and S. F. Simpura.

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 337-345. 18 refs. In Russian.

Discussion of the physiological reactions of the crew of Voskhod 1 (Komarov, Feoktistov, Egorov) to accelerations, as revealed by electrocardiograms, seismocardiograms, pneumograms, TV observations, and personal reports. It is shown that the physiological reactions of the crew members during the powered phase were characterized by an emotional stress that was appreciably higher than during simulation on the centrifuge. During reentry, Feoktistov and Egorov exhibited some peculiar physiological responses to accelerations, which are explained in terms of vestibular and vegetative disturbances experienced previously in the weightless state.

V. P.

A66-32937 #

PATHOMORPHOLOGICAL CHANGES IN THE HEMOPOIETIC ORGANS OF MICE UNDER THE COMBINED EFFECT OF CERTAIN TYPES OF IONIZING RADIATION AND DYNAMIC SPACEFLIGHT FACTORS [PATOMORFOLOGICHESKIE IZMENENIIA V KROVE-TVORNYKH ORGANAKH MYSHEI PRI KOMBINIROVANNOM DEISTVII NEKOTORYKH VIDOV IONIZIRUIUSHCHEI RADIATSII I DINAMICHESKIKH FAKTOROV KOSMICHESKOGO POLETA].

N. A. Gaidamakin, V. G. Petrukhin, V. V. Antipov, P. P. Saksonov, and V. S. Shashkov.

(Chekhoslovatskaia Akademiia Nauk, Institut Biologicheskoi Fiziki, Jubileinyi Simpozium, Brno, Czechoslovakia, May 4-7, 1965.)

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 346-354. 20 refs. In Russian.

Laboratory investigation of the pathomorphological changes in the hemopoietic organs of mice after exposure to the combined effects of proton radiation and vibration and gamma radiation and acceleration. It is found that exposure to vibration lasting three days prior to proton irradiation increased the lesion of the spleen lymphoid tissues and decreased that of the hemopoietic cells associated with myelo- and erythroblastic processes in the spleen and marrow. The recovery of all types of hemopoiesis in these organs increases. The effect of vibrations applied three and, particularly, five days after proton irradiation enhances destructive changes in the hemopoietic organs. Necrotic foci were found in these organs during the recovery period, while reparative processes were found to slow down. The effect of acceleration applied one day before gamma irradiation is found to decrease depletion of the hemopoietic organs and to promote their recovery. Acceleration applied one day after gamma irradiation produced no effect on the degree of damage of the organs by penetrating radiation.

V. P.

A66-32938 #

COMBINED EFFECT OF IONIZING RADIATION AND VIBRATION ON LIVING ORGANISMS [KOMPLEKSNOE VOZDEISTVIE NA ORGANIZM ZHIVOTNOGO IONIZIRUIUSHCHEGO IZLUCHENIIA I VIBRATSII].

T. S. L'vova.

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 355-361. 20 refs. In Russian.

Laboratory investigations showing that exposure of mice to vibrations at a frequency of 70 cps 4 and 24 hr prior to irradiation tends to lessen their mortality by 10 to 20% and increase their mean longevity by 10 to 40% as compared with control animals exposed to irradiation without prior application of vibration. Vibration applied 5 days prior to irradiation, however, was found to increase mortality and decrease longevity. Exposure to vibration 4 hr, 24 hr, and 5 days after irradiation was found to decrease mortality by 15 to 38% and to increase mean longevity.

V. P.

A66-32939 #

SOME RESULTS AND PROBLEMS IN THE STUDY OF RADIATION-PROTECTION MECHANISMS [NEKOTORYE ITOGI I ZADACHI IZUCHENIIA MEKHANIZMOV PROTIVOLUCHEVOI ZASHCHITY]. E. Ia. Graevskii (Akademiia Nauk SSSR, Institut Morfologii Zhivotnykh, Moscow, USSR).

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 376-382. 30 refs. In Russian.

Investigation showing that during the period of their radio-protective activity, radiation-protective agents (anoxia, serotonin, aminothiols) tend to increase the content of sulfhydryl groups in the spleen of mice and the Ehrlich ascite carcinoma cells. Modified resistance of an animal produces corresponding changes in the content of sulfhydryl groups. It is suggested that the radio-protective effect is not produced directly by the agents but rather by the property of the agents to increase the content of sulfhydryl groups.

V. P.

A66-32940 #

RADIATION DAMAGE OF PROTEIN MOLECULES AND MOLECULAR MECHANISMS OF RADIO-PROTECTION [RADIATSIONNOE PORAZHENie BELKOVYKH MOLEKUL I MOLEKULIARNTYE MEKHANIZMY ZASHCHITY].

L. Kh. Eidus (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR).

(Akademiia Nauk SSSR, Otdelenie Biokhimii, Biofiziki i Khimii Fiziolicheski Aktivnykh Soedinenii, Sessaiia, USSR, Oct. 27, 1965.)

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 383-392. In Russian.

Review of modern concepts of the mechanisms of the action of chemical radio-protective agents, in the light of the author's laboratory results. A general physical mechanism of chemical radio-protection is proposed for both molecules and cells. Its idea is that molecules of various substances at relatively high concentrations adsorb on damaged biological structures and prevent their postradiation destruction by stabilizing the defects.

V. P.

A66-32941 #

PECULIARITIES OF THE FUNCTIONING OF THE HUMAN ACOUSTIC ANALYZER UNDER THE EFFECT OF CORIOLIS ACCELERATIONS OF VARIOUS MAGNITUDES [OSOBENNOSTI FUNKTSII SLUKHOVOGO ANALIZATORA CHELOVEKA PRI VOZDEISTVII RAZLICHNYKH VELICHIN USKORENII KORIOLisa].

Iu. V. Krylov.

Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia, May-June 1966, p. 424-426. 5 refs. In Russian.

Experimental investigation of the changes in the acoustic thresholds of man after a 24-hr period spent in a room rotating at an angular velocity of 5.3, 10.6, and 21.3 deg/sec. For a 24-hr stay in a small (nonrotating) cubicle, the acoustic sensitivity is found to fluctuate in the range between 10 and 12.5 db. Rotation for a period of 24 hr at an angular velocity of 5.3 deg/sec does not seem to affect acoustic sensitivity. Angular velocities of 10.6 and 21.3 deg/sec produce fluctuations in acoustic sensitivity from 12.5 to 25 db.

V. P.

A66-33027 #

EFFECTS OF SONIC BOOM ON PEOPLE - REVIEW AND OUTLOOK.

Henning E. von Gierke (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

(Acoustical Society of America, Symposium on Sonic Boom, St. Louis, Mo., Nov. 3, 1965, Paper.)

Acoustical Society of America, Journal, vol. 39, May 1966, p. S43-S50. 21 refs.

Review of the history of observations on human reactions to sonic boom from the time when the boom was a demonstration curiosity to the present day. Although the data accumulated during this period might be adequate to decide on preliminary stopgap exposure criteria, it is considered obvious that a broader approach to the problem is required. Laboratory work in support of these questions has hardly been started. Neither conventional acoustic and vibration generators for boom-type stimulation nor special

A66-33028

equipment for high-fidelity sonic-boom simulation have been fully utilized. Open questions and possible approaches are discussed.

M.M.

A66-33028

EFFECTS OF SONIC BOOM ON PEOPLE - ST. LOUIS, MISSOURI, 1961-1962.

Charles W. Nixon (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) and Paul N. Borsky (Chicago, University, National Opinion Research Center, Chicago, Ill.).

(Acoustical Society of America, Symposium on Sonic Boom, St. Louis, Mo., Nov. 3, 1965, Paper.)

Acoustical Society of America, Journal, vol. 39, May 1966, p. S51-S58. 5 refs.

NASA-supported research.

The vicinity of St. Louis, Missouri, was exposed to approximately 150 sonic booms during a 10-month period from July 1961 to April 1962. Ground overpressures, ranging up to about 3 lb/ft², were carefully measured for a series of 17 of the supersonic flights. Data obtained from over 2300 direct interviews, analyses of complaints, and engineering evaluations of alleged damage were related to information on aircraft operations and sonic-boom overpressure measurements. Most residents interviewed indicated some interference with routine living activities, yet less than 1% filed formal complaints. Alleged building damage was superficial in nature and consisted mostly of cracks in brittle surfaces. There were no reports of direct adverse physiological effects.

(Author)

A66-33029

EXPERIENCE IN THE UNITED KINGDOM ON THE EFFECTS OF SONIC BANGS.

C. H. E. Warren (Ministry of Aviation, Royal Aircraft Establishment, Farnborough, Hants., England).

(Acoustical Society of America, Symposium on Sonic Boom, St. Louis, Mo., Nov. 3, 1965, Paper.)

Acoustical Society of America, Journal, vol. 39, May 1966, p. S59-S64. 5 refs.

Over the past five years, a number of exercises involving the making of sonic booms have been staged in the United Kingdom. The booms have been made both by flying aircraft at supersonic speeds and by firing explosive charges. From this work, information has been obtained on the intensities and waveforms of aircraft sonic booms as measured outdoors, on the nature of the disturbances that are recorded inside buildings, and on the subjective reaction of people to these booms.

(Author)

A66-33030

LABORATORY TESTS OF PHYSIOLOGICAL-PSYCHOLOGICAL REACTIONS TO SONIC BOOMS.

K. D. Kryter (Stanford Research Institute, Menlo Park, Calif.).

(Acoustical Society of America, Symposium on Sonic Boom, St. Louis, Mo., Nov. 3, 1965, Paper.)

Acoustical Society of America, Journal, vol. 39, May 1966, p. S65-S72. 25 refs.

Investigations of the physiological-psychological responses to impulsive acoustic stimuli and to sonic booms at the intensities anticipated from commercial supersonic aircraft have been conducted in the laboratory. Studies of interest include those concerned with (1) the relative subjective noisiness and loudness of booms having different waveforms, (2) the reactions of people to booms as an auditory experience (subjective rating of booms vs other acoustical stimuli), (3) startle reactions to acoustic stimuli, and (4) arousal from sleep by acoustic stimuli. The methods and results of pertinent laboratory experiments are discussed.

(Author)

A66-33089

A LOCAL SIGN FOR DEPTH.

T. G. R. Bower (Harvard University, Dept. of Psychology, Cambridge, Mass.).

Nature, vol. 210, June 4, 1966, p. 1081, 1082. 12 refs.

Results of a test of Schön's hypothesis that time of arrival at the cortex be considered as the code mediating the addition of depth-values to retinal input. By varying the time of arrival of disparate images of an object on the temporal hemiretinae of one eye and the nasal hemiretinae of the other, it is shown that Schön's hypothesis can provide a mechanism to explain the depth-values figuring in Hering's theory of stereopsis as the means by which retinal disparity is decoded into perceived spatial separation. It is concluded that Hering's theory of stereopsis is probably correct, if time of arrival of signals at the cortex is introduced to provide a mechanism to account for depth-values.

A. B. K.

A66-33093

ADAPTIVE RESPONSES OF ADRENAL CORTEX TO SOME ENVIRONMENTAL STRESSORS, EXERCISE AND ACCELERATION.

D. Jovy, H. Brünner, K. E. Klein, and H. M. Wegmann (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).

IN: HORMONAL STEROIDS, BIOCHEMISTRY, PHARMACOLOGY AND THERAPEUTICS; PROCEEDINGS OF THE FIRST INTERNATIONAL CONGRESS ON HORMONAL STEROIDS, MILAN, ITALY, 1962. VOLUME 2.

Edited by L. Martini and A. Pecile.

New York, Academic Press, Inc., 1965, p. 545-553. 25 refs.

Measurements of changes of the free plasma 17-hydroxy-corticosteroids of the eosinophile blood cells in male persons unadapted and adapted to stress under the influence of single or combined stressors consisting of muscular exercise, heat, cold, oxygen want, and acceleration. The results are discussed in terms of how far the observed responses of the hypophyseal-adrenocortical axis can be taken as an expression of the individual's sensitivity toward stress and, as such, represent a suitable criterion of practical importance.

M. M.

A66-33205

FLIGHT SIMULATOR TECHNIQUES APPLIED TO ALL WEATHER LANDING PROBLEMS.

D. Wilson and J. Hands (General Precision Systems, Ltd., Aylesbury, Bucks., England).

IN: INTERNATIONAL FEDERATION OF AIR LINE PILOTS' ASSOCIATIONS, SYMPOSIUM ON ALL WEATHER OPERATIONS, HEAD UP DISPLAYS, LONG RANGE NAVIGATIONAL AIDS, ROTTERDAM, NETHERLANDS, OCTOBER 13-16, 1965, REPORT. VOLUME 1. [A66-33198 17-21]

London, International Federation of Air Line Pilots' Associations, 1965. 3 p.

Brief summary of the main features of simulator training equipment made by General Precision Systems, Ltd. The accurate simulation of actual flight conditions is emphasized. Five features are briefly discussed: color television on nearly all systems sold, which gives a brighter picture with better resolution than a previous monochrome system; compatibility with the flight simulator; airport landing systems that include strobe flash lighting and VASI lights; optics designed so that all rotational freedoms are related to glassware; and improvements in collimation, or virtual image of the picture.

M. L.

A66-33446

CONTROL FEEL AND THE DEPENDENT VARIABLE.

Alan A. Burrows (Douglas Aircraft Co., Inc., Aircraft Group, Biotechnology Section, Long Beach, Calif.).

Human Factors, vol. 7, Oct. 1965, p. 413-421. 19 refs.

Survey of the current status of research on control feel, particularly as applied to aircraft controls. The relationship of control feel to the error term used in describing complex traffic behavior is described. Suggestions are made for further research.

R. A. F.

A66-33448

A PSYCHOPHYSIOLOGICAL STUDY OF COMPENSATORY TRACKING ON A DIGITAL DISPLAY.

Alan J. Benson (Royal Air Force, Institute of Aviation Medicine, Neurobiology Section, Farnborough, Hants., England), Jo H. F. Huddleston, and John M. Rolfe (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

Human Factors, vol. 7, Oct. 1965, p. 457-472. 26 refs.

Comparable performance on a compensatory tracking task was achieved with a purely digital altimeter display and with a combined digital and scale-and-pointer display. Performance of a subsidiary, light responding, task was degraded significantly when the digital task was employed. In the presence of the subsidiary task a larger change was recorded in a number of physiological variables (heart rate, muscle activity, skin resistance and respiration) with the digital than with the counter-pointer display. Thus, both performance and physiological measures indicated that parity of performance on the primary task was achieved by increased "effort" when using the digital display. (Author)

A66-33449

HUMAN FACTORS ASPECTS OF DIGITAL COMPUTER PROGRAMMING FOR SIMULATOR CONTROL.

Gilbert J. Spesock (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.) and Robert S. Lincoln (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Research and Development Div., Human Performance Laboratory, Sunnyvale, Calif.)

Human Factors, vol. 7, Oct. 1965, p. 473-482.

USAF-supported research.

Outline of human-factors considerations critical to the development of any compiler program. The application of these considerations is illustrated by reference to a specific compiler developed for use in a simulation laboratory concerned with real-time problems. R. A. F.

A66-33682

A HUMAN CRITERION FOR THE ACCEPTANCE OF TRANSVERSE SEAT VIBRATION.

W. D. Bryce (Ministry of Aviation, National Gas Turbine Establishment, Farnborough, Hants., England).

(Symposium on the Noise and Loading Actions on Helicopters, V/STOL Aircraft and Ground Effect Machines, Institute of Sound and Vibration Research, Southampton, England, Aug. 30-Sept. 3, 1965, Paper.)

Journal of Sound and Vibration, vol. 3, May 1966, p. 384-392. 6 refs.

A controlled laboratory experiment was carried out in order to provide some information on the maximum level of transverse (side-to-side) seat vibration which is permissible for a few minutes for passenger comfort. The subjective responses of 121 individuals were used to establish a tolerance criterion applicable to sinusoidal motion over a frequency range extending from 5 to 32 cps. The results indicate that a peak acceleration limit of 0.2 g from 5 to 8 cps and a constant velocity limit above 8 cps will be acceptable to 95% of the population for a short period. The major factor limiting the allowable vibrations was associated with visual effects and, hence, the provision of a moving visual target is considered to be an important feature of the experiment. From a comparison with other work in this field, it is suggested that when appreciable lateral support is incorporated into the seat the acceptable level of vibration is increased and the minimum tolerance is in the region of 5 cps.

(Author)

A66-33691

HUMAN CEREBROVASCULAR RESPONSE TIME TO ELEVATION OF ARTERIAL CARBON DIOXIDE TENSION.

William Shapiro, Albert J. Wasserman (Virginia, Medical College, Dept. of Medicine, Richmond, Va.), and John L. Patterson, Jr. (National Heart Institute, Richmond, Va.).

(Interamerican Congress of Cardiology, 7th, Montreal, Canada, June 1964, Paper.)

Archives of Neurology, vol. 13, Aug. 1965, p. 130-138. 29 refs. Research supported by the Richmond Area Heart Association; Public Health Research Grant No. FR 0001602; Grant No. NSG-156-61.

Quantitative description of the pattern of change in human cerebral blood flow (CBF) during the period of time immediately following initiation of CO₂ inhalation. The results of this study are said to provide the most complete description of the initial response of the human cerebral blood vessels to the impact of a rapid change in arterial CO₂ tension that is presently available. B. B.

A66-33697

OCCURRENCE OF THE ADENOSINE MONOPHOSPHATE INHIBITION OF CARBON DIOXIDE FIXATION IN PHOTOSYNTHETIC AND CHEMOSYNTHETIC AUTOTROPHS.

Emmett J. Johnson (Mississippi, University, Medical Center, Dept. of Microbiology, Jackson, Miss.; NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

(American Society for Microbiology, Annual Meeting, 65th, Atlantic City, N.J., Apr. 25, 1965, Paper.)

Archives of Biochemistry and Biophysics, vol. 114, Apr. 1966, p. 178-183. 8 refs.

Demonstration that the phenomenon of AMP inhibition of ATP-dependent autotrophic CO₂ fixation, first observed in extracts of *Thiobacillus thioautotrophicus*, also occurs in extracts of *Chromatium D* and *spinach* (*Spinacea oleracea*). In *Chromatium* extracts, inhibition of greater than 90% occurred at a ratio AMP/ATP of 0.5, whereas in *spinach* 60% inhibition occurred at a ratio of 2. Of the mononucleotides, only AMP produced an inhibition in extracts of *Chromatium*; however, CMP produced some inhibition in *spinach* extracts, but less than AMP. In *Chromatium*, ADP also inhibited ATP-dependent CO₂ fixation, but a higher ratio of ADP to ATP was required than with AMP. In *spinach* extracts, ADP was more inhibitory than AMP. The inhibition did not seem to be due to nonspecific binding of magnesium ions or reversal of adenylic kinase activity. F. R. L.

A66-33699

MEDICAL AND BIOLOGICAL STUDIES IN SPACE [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIYA V KOSMOSE].

V. V. Parin.

Akademiia Nauk SSSR, Vestnik, vol. 36, Apr. 1966, p. 24-29. 8 refs. In Russian.

Brief review of space medicine and biology problems in the light of experience with experimental animals and manned spacecraft. Stability of the human organism toward spaceflight environmental factors is viewed as the principal problem of future studies. V. Z.

A66-33715

TRIAxIAL BALLISTOCARDIOGRAM IN A WEIGHTLESS ENVIRONMENT.

D. E. Beischer and W. Carroll Hixson (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.). IN: WORLD CONGRESS BALLISTOCARDIOGRAPHY AND CARDIOVASCULAR DYNAMICS, 1ST, AMSTERDAM, NETHERLANDS, APRIL 12-14, 1965, PROCEEDINGS.

Basel, S. Karger, 1966, p. 85-89.

NASA Grant No. R-10-009-013.

Study of the collection of BCG data using a suspension system with six degrees of unrestricted motion. The gravity-free state experienced for a short time during the ballistic flight of a jet aircraft performing Keplerian trajectories provided a suspension free of coupling to the ground. By allowing the subject to float free during the weightless period of the flight, and by telemetering the instantaneous linear and angular accelerations of his body to an on-board data collecting station, it was found to be possible to display a triaxial inertial acceleration ballistocardiogram of a man in gravity-free environment. F. R. L.

A66-33742

IMAGE INTERPRETATION IN A SPACE ENVIRONMENT.

Paul E. Resta (Goodyear Aerospace Corp., Litchfield Park, Ariz.).

(American Society of Photogrammetry, Annual Convention, Washington, D.C., Mar. 29-Apr. 2, 1965, Paper.)

Photogrammetric Engineering, vol. 31, Nov. 1965, p. 1010-1017. 20 refs.

Study of certain potential problems of image interpretation in manned space surveillance systems. An attempt is made to assess the effect of a space environment on man's visual capability. Some of the factors influencing the anticipated quantity and quality of sensor imagery to be processed by a spaceborne interpreter are discussed. The relationship between scale factor, display size, and resolution requirements is considered as a prerequisite to the evaluation of imagery displays for a specific type of interpretation task. Certain functions that a spaceborne interpreter may be required to perform are taken into account. A. B. K.

A66-33744

A66-33744

EVALUATING THE POTENTIAL OF PHOTO INTERPRETERS.
Gene Avery (Georgia, University, School of Forestry, Athens, Ga.).
(American Society of Photogrammetry, Annual Convention,
Washington, D.C., Mar. 29-Apr. 2, 1965, Paper.)
Photogrammetric Engineering, vol. 31, Nov. 1965, p. 1051-1059.
10 refs.

Description of a series of screening tests designed to predict the potential ability of persons to be trained as aerial photo interpreters. Brief descriptions are given of seven different types of screening tests employed. An attempt is made to assess the true value of these tests on the basis of preliminary performance results. The test categories likely to be given priority in the final performance tests are cited.

A. B. K.

A66-33761

INTRODUCTION TO THE PROBLEM OF THE RETICULAR FORMATION.

Warren S. McCulloch and William L. Kilmer (Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.).

IN: AUTOMATA THEORY.

Edited by E. R. Caianiello.

New York, Academic Press, Inc., 1966, p. 269-277.

National Institutes of Health Grants No. NB-04985-01; No. MH-04737-04; NSF Grant No. GP-2495; Contracts No. DA-36-039-AMC-03200(E); No. AF 33(615)-1747; No. AF 19(628)-3807; Grant No. NSG-496.

Study of the central problem of coordinate nervous activity - namely, the functional organization of the core of the reticular formation. Every neuron is regarded as a highly nonlinear oscillator. The term "reticular formation" is delineated and the reticular core is studied. It is noted that the reticular formation is an iterative net certainly at the segmental level, and probably, from the flattening of the dendritic field, at an even finer level. Looked at in cross section, it is a computer which is very wide but only one cell deep. Only its longitudinal structure gives it effective depth. The physiological clues discussed are found to be very partial. Data are given which show in simplified form the ability of the reticular core to commit the remainder of the whole organism, or the isolated fragment, to one mode of behavior. The job of the reticular formation is, on receipt of signals from within the organism and the world around it, to discover promptly how to classify the event as a case under one or another of its few inherited diagnostic categories for which it has a repertoire of appropriate rules of conduct.

M. F.

A66-33768

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE.

I - INTRODUCTION AND GENERAL EXPERIMENTAL DESIGN.

J. J. Hargreaves, W. G. Robertson, Frode Ulvedal, H. J. Zeff, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, June 1966, p. 552-555. 30 refs.

Four Air Force aircrew members, ranging in age from 27-29 years, lived in the USAFSAM double-wall test cell for 68 consecutive days. The test cell, with a total volume of 40.2 cubic meters, was operated at ground level for 8 days, at 257.7 mm Hg for 56 days, and at ground level for 4 days. During the 56 days at 257.7 mm Hg total pressure, the atmosphere consisted of 175.2 mm Hg P_{O_2} and 73.9 mm Hg P_{He} . P_{N_2} averaged 1.9 mm Hg. The purpose of the experiment was to evaluate the physiologic suitability of this atmosphere for use in future manned space missions. This suitability was established by detailed, repetitive examination of physiologic functions throughout the course of the experiment.

(Author)

A66-33769

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE.

II - MAJOR AND MINOR ATMOSPHERIC COMPONENTS.

J. D. Adams, James P. Conkle, William E. Mabson, Jack T. Watson, Patricia H. Wolf, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, June 1966, p. 555-558.
Contracts No. AF 41(609)-2958; No. AF 41(609)-2783.

The atmosphere to which four human volunteers were exposed for 56 days during a study designed to describe the effects of oxygen helium on man was analyzed for major and minor constituents. The partial pressure of the major constituents, oxygen (175.2 ± 2.4 mm Hg) and helium (73.9 ± 2.3 mm Hg), remained within the established experimental parameters. Sixty-eight minor constituents were detected. The concentration of these compounds remained below a level thought to cause a physiologic effect. The instrumental methods employed were sufficient for a comprehensive analysis of the synthetic atmosphere.

(Author)

A66-33770

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE.
III - RENAL RESPONSE.

H. V. Glatte and C. L. Giannetta (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, June 1966, p. 559-562. 25 refs.

To assess the effects of helium on renal function, four healthy Air Force officers lived for 56 days in a space cabin simulator with a partial pressure of oxygen of 175 mm Hg and helium of 74 mm Hg at a total pressure of 258 mm Hg. All renal parameters measured during the control and experimental periods failed to reveal any deviation from accepted normals. Studies performed included renal hemodynamics utilizing inulin, PAH, and endogenous creatinine clearances; concentrating and diluting tests; and 24-hr urinary excretion of proteins. In addition, multiple determinations of blood pH and standard bicarbonate utilizing a modified Astrup technique were normal. It was concluded that the experimental atmosphere had no adverse effect on renal function.

(Author)

A66-33771

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE.
IV - SELECTED BLOOD ENZYME RESPONSE.

M. J. Bartek, Frode Ulvedal, and H. E. Brown (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Chemistry Section, Brooks AFB; Technology, Inc., San Antonio, Tex.).
Aerospace Medicine, vol. 37, June 1966, p. 563-566. 14 refs.

An oxygen-helium atmosphere at a total pressure of 258 mm Hg was evaluated for 56 days with four normal subjects to determine what effects it had on a selected group of serum enzymes and on enzyme-mediated erythropoietic mechanisms. Weekly serum lactic dehydrogenase, lactic dehydrogenase isozymes, glutamic dehydrogenase and lipase determinations were made as well as hematocrit, erythrocyte glucose-6-phosphate dehydrogenase, glutathione and glutathione stability measurements. A 14% decrease in lactic dehydrogenase was observed, as well as a slight decrease in the "heart" isozyme during the experimental period. Glutamic dehydrogenase remained well within the normal range and lipase was not detected. There was a 3.4% decrease in hematocrit during the postexperimental period, with an accompanying slight increase in glucose-6-phosphate dehydrogenase, glutathione, and glutathione stability. Considering that all values obtained were well within the normal range, man appears to tolerate this atmosphere quite well.

(Author)

A66-33772

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE.
V - EXERCISE PERFORMANCE AND CARDIOVASCULAR RESPONSE.

Howard J. Zeff, William G. Robertson, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, June 1966, p. 566-571. 15 refs.

Four healthy Air Force crew members participated in an experiment to evaluate an oxygen-helium environment at 258 mm Hg for future manned space flights. For three weeks prior to entering the space cabin simulator, the subjects took part in a program of physical exercise on a Collins bicycle ergometer. During the 56 days of the atmosphere test, they exercised 6 days per week on the same bicycle ergometer with three daily 20-min exercise periods. Each exercise period was graded with a warmup, moderate load (pulse, 150-160/min), and heavy load (pulse, 170-180/min). The workloads were determined prior to the subjects entering the chamber and remained constant. Pulse rates during moderate and heavy exercise revealed an initial fall, corresponding to conditioning and increased efficiency with the ergometer. Subsequently, these parameters leveled off except for one subject who showed a minimal rise in pulse rates during the latter half of the confinement period. Stress testing was performed immediately before and after the atmosphere test phase. Treadmill times (Balke test) showed slight improvement in the postexperimental period. Maximum oxygen consumption measurements on the bicycle ergometer postexperimentally were diminished by 2.9 to 9.4 ml/min/kg from initial values. Changes in plasma volume (pre- to posttest) ranged from -143 cc to +222 cc. Tilt table studies showed little change from earlier tests with no syncope symptoms. It was felt that the programmed daily exercise was adequate in preventing a significant deconditioning effect or orthostatic intolerance. (Author)

A66-33773

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. VI - EXCRETION OF STEROIDS AND CATECHOLAMINES. Frode Ulvedal and Ann J. Roberts (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Chemistry Section, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, June 1966, p. 572-578. 22 refs.

The urinary excretion of 17-hydroxycorticosteroids, corticosterone-like hormones, epinephrine and norepinephrine was measured in an attempt to evaluate the degree of emotional and physical stress experienced by subjects participating in an oxygen-helium atmosphere experiment at 258 mm Hg total pressure for 56 days. The values obtained for these variables were within physiologic range for this type of experiment, but several trends were observed. Differences in the rest-day values vs work-day values were noted. A reversal in the normal 12-hr excretion ratio took place for the subjects who slept during the days and worked during the nights, as measured by the 17-OHCS and corticosterone-like hormones. The effect of diet and exercise in this environment was also reported. Thus, it appears that the oxygen-helium atmosphere utilized in this experiment provides satisfactory environmental conditions for human activity over a prolonged period of confinement. (Author)

A66-33774

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. VII - RESPIRATORY FUNCTION.

W. G. Robertson and G. L. McRae (USAF, Systems Command Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, June 1966, p. 578-582. 20 refs.

The respiratory effects of a 56-day exposure to an oxygen partial pressure of 175.2 mm Hg with a helium partial pressure of 73.9 mm Hg at a total pressure of 257.7 mm Hg were evaluated in four healthy U.S. Air Force crew members. Control data were obtained during an 8-day preexperimental and a 4-day postexperimental period. Steady-state carbon monoxide diffusing capacities were unchanged pre- and postexperimentally. Basal oxygen consumption and carbon dioxide production were increased throughout the experimental period. This increase is attributed to an increased water loss at altitude. Vital capacities were decreased approximately 4% with ascent to altitude but returned toward preexperimental values with time. Vital capacities were all normal immediately on descent from altitude. Lung compartment measurements reflected the decrease in vital capacity at altitude as

an apparent decrease in total lung volume as a function of a decreased expiratory reserve volume. Residual volumes were unchanged. Maximum breathing capacities increased approximately 40% as a function of the decreased atmospheric density. There were no changes that would indicate that this atmosphere produces any impairment of man's pulmonary function. (Author)

A66-33775

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. VIII - OBSERVATIONS ON FEEDING BITE-SIZE FOODS.

Norman D. Heidelbaugh, John E. Vanderveen, Mary V. Klicka, and May J. O'Hara (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.; U.S. Army, Natick Laboratories, Natick, Mass.). Aerospace Medicine, vol. 37, June 1966, p. 583-590. 22 refs. USAF-sponsored research.

Twenty-one bite-size foods supplemented with eight fruit juices, an enriched drink, coffee, tea, sugar, a vitamin-mineral tablet and water ad libitum were arranged into a 2-day menu cycle. This feeding system was offered to four flight crew members as the sole source of nutrients for a period of 72 days, including 56 consecutive days in a space vehicle simulator containing an atmosphere of 257.7 mm Hg total pressure including 175.2 mm Hg P_{O_2} and 73.9 mm Hg P_{He} . The relationship between the consumption of food and the following was studied: initial and mean acceptability ratings by the subjects, ratings by a technical taste panel, rehydratability, and fat content of the food. Trends in each subject's consumption and acceptability rating of each food item were studied as a function of time. The manufacturing procedures and criteria for each food are outlined. Suggestions are offered for adapting this type of feeding system to aerospace situations. (Author)

A66-33776

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. IX - NUTRITIONAL EVALUATION OF FEEDING BITE-SIZE FOODS.

John E. Vanderveen, Norman D. Heidelbaugh, and May J. O'Hara (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, June 1966, p. 591-594. 11 refs.

A feeding system composed of beverages and bite-size foods was used to support four flight crew members for 72 days. During the experiment, the crew spent 56 consecutive days in a four-man space cabin simulator at 258 mm Hg total pressure, including 175.2 mm Hg P_{O_2} and 73.9 mm Hg P_{He} . Energy was supplied to each crew member proportionally to his lean body weight. Metabolic balance studies were performed every 4 days of the experiment. The digestibility of energy and protein was low and was probably caused by the high melting point of the fat used in the formulation and coating of the bite-size foods. Fecal fat levels were high; however, there were no indications that a gastrointestinal disorder was associated with the low fat absorption. These studies indicate that bite-size foods are useful in supporting men in simulated aerospace conditions, but new coatings are required to allow maximum digestibility of nutrients with minimum waste production. (Author)

A66-33777

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. X - ENTERIC MICROBIAL FLORA.

Joseph T. Cordaro, Walter M. Sellers, Robert J. Ball, and Jerome P. Schmidt (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biosciences Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, June 1966, p. 594-596.

One hundred twenty-four fecal samples collected during various phases of the study were examined to determine any changes which may have occurred in the bacterial flora. The counts of all microorganisms remained within the normal range except those for the enterococci. There was a decrease in the number of enterococci as the subjects went on the experimental diet, but the values returned to normal as the regular diet was resumed after the 56-day

A66-33778

flight. The change observed was not considered to be of clinical significance. (Author)

A66-33778 =

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. XI - ORAL, CUTANEOUS, AND AEROSOL BACTERIOLOGIC EVALUATION.

James E. Moyer, Dorothy G. Farrell, W. L. Lamb, and J. L. Mitchell (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB; USAF, Systems Command, Aerospace Medical Div., Epidemiological Laboratory, Lackland AFB, Tex.). *Aerospace Medicine*, vol. 37, June 1966, p. 597-600. 6 refs.

Studies were initiated to determine the numbers, distribution, and types of microorganisms encountered under conditions of a sealed environment for extended periods of time, such as would occur during space explorations. A 56-day experiment, utilizing four test subjects confined within a double-walled test cell in an oxygen-helium atmosphere at 258 mm Hg, was performed. Quantitative counts of the aerobic microorganisms present in the circulating atmosphere as well as those present on the skin of the subjects were established. Distribution of coagulase positive, phage typable *Staphylococcus aureus* strains and predominant microbial types in throat, nasal, skin and aerosol samples was determined. Evidence of a staphylococcal transfer between subjects was obtained. Implications of these findings, as related to the utilization of the two-gas atmosphere for future spaceflights, are discussed. (Author)

A66-33779 =

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. XII - CLINICAL OBSERVATIONS.

Howard J. Zeff, Lester J. Krasnogor, George J. Mottsay, Hayden V. Glatte, William G. Robertson, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 37, June 1966, p. 601-604. 16 refs.

The present report describes the clinical findings in four aircrew members who lived for 56 days in an oxygen-helium environment at 258 mm Hg total pressure. During pre- and postexperimental periods, the subjects underwent a complete medical evaluation to include appropriate roentgenographic studies, electrocardiograms, electroencephalograms, and blood chemistries. During the 56-day test phase, clinical symptoms were minimal. Most bothersome to the subjects were increased amounts of flatulence, only rarely causing abdominal discomfort from trapped intestinal gas. All of the individuals developed mucous membrane dryness associated with a decreased relative humidity in the chamber. Two subjects noted nasal congestion and none experienced middle ear problems. One individual developed mild elevations in transaminase enzymes which could not be explained. Resting electrocardiograms from another subject showed intermittent changes consistent with the Wolf-Parkinson-White syndrome, which could not be attributed to the environment. Daily exercise was performed on a bicycle ergometer without symptoms or signs of a decompression disturbance. At no time during the experiment were there any clinical disturbances which might have prevented the completion of a prolonged manned space mission. (Author)

A66-33780 =

STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. XIII - BEHAVIOR FACTORS.

D. W. Rodgin and B. O. Hartman (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aerospace Medicine Branch and Biodynamics Branch, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 37, June 1966, p. 605-608.

Four officer aircrewmembers performed psychomotor tests three times daily and reported on sleep once a day during a 56-day exposure to an oxygen-helium atmosphere at 258 mm Hg total pressure. Psychomotor and sleep changes were minimal and essentially benign. Adaptation to altered schedules was generally good except for persistent complaints about sleep (not fully supported by sleep histories) from one subject. The tempo of activity and physical exercise

regimen apparently prevented behavioral manifestations of deconditioning frequently seen in confinement studies. (Author)

A66-33781

INFLUENCE OF VIBRATIONS ON CHROMOSOMES.

James C. Knepton, Jr. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

(*Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.*)

Aerospace Medicine, vol. 37, June 1966, p. 608-612. 10 refs. NASA-sponsored research.

Russian workers have discovered chromosome rearrangements in microspores of *Tradescantia paludosa* which were subjected to the flight factors of their Vostok series of earth-satellite experiments. They stress the importance of vibration as a contributory factor to disturbances of chromatin material during microsporogenesis in *Tradescantia*. This report gives the results of an initial series of experiments in which cells from various organisms were vibrated at frequencies of 40 and 70 cps with 10 and 20 G. Microspores of *Tradescantia paludosa* (Clone 3 of Sax), conidia of *Neurospora crassa* (L-prolineless clock-mutant, FGSC No. 491a), *Neurospora crassa* (N.C.R. No. 865A), and ova, larvae, and pupae of *Drosophila melanogaster* (wild type) were studied for chromosomal rearrangements. No influence was found of these vibration frequencies and accelerations on *N. crassa*, *T. paludosa*, and the F_1 generation of *D. melanogaster*, but there was observed the presence of body color and wing shape mutants among the F_1 generation of *D. melanogaster*. In future work these organisms will be subjected to other frequencies and displacements of vibration. (Author)

A66-33782

TASK INTERRUPTION AND PERFORMANCE DECREMENT FOLLOWING RAPID DECOMPRESSION.

William F. O'Connor and George E. Pendergrass (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 37, June 1966, p. 615-617.

Sixteen subjects, active pilots and flight crew personnel, were decompressed to altitudes of 25, 27, 30, 35, or 41 thousand feet while performing a task on the Scow coordinator. All subjects were current on their medical qualifications, and all but two were physiologically trained. Results showed a marked decrement in performance following decompression, with the decrement increasing as decompression altitude increased and persisting for 3-4 minutes. Measuring only mask-donning time underestimates the performance gap following decompression. Estimates of the performance gap were found to agree with value obtained by Bennett in his study of aircraft decompressions. (Author)

A66-33792 =

CREW RELIABILITY DURING SIMULATED SPACE FLIGHT.

Milton A. Grodsky, Thomas M. Flaherty (Martin Marietta Corp., Martin Co., Man-Machine Engineering Dept., Baltimore, Md.), and Heber G. Moore (NASA, Office of Manned Space Flight, Washington, D.C.).

(*American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-275.*)

Journal of Spacecraft and Rockets, vol. 3, June 1966, p. 810-817. 9 refs.

Contract No. NASw-833.

[For abstract see issue 12, page 1653, Accession no. A65-22125]

A66-33821 =

ORBITAL MAINTENANCE.

William R. Pierson and Raymond E. Geller (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).

(*AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965. TECHNICAL PAPERS*, p. 303-305.)

Journal of Spacecraft and Rockets, vol. 3, June 1966, p. 941, 942. 8 refs.

[For abstract see issue 02, page 186, Accession no. A66-11645]

A66-33843 =

TWO-PHOTOCELL MODEL SIMULATING HUMAN COLOR VISION AND ITS ANOMALIES [MODEL' S DVMIA FOTOELEMENTAMI, IMITIRUIUSHCHAIYA TSVETOVOE ZRENIE CHELOVEKA I EGO ANOMALI].

N. G. Volkov and V. K. Liapidevskii (Moskovskii Inzhenerno-Fizicheskii Institut, Moscow, USSR).

Akademiia Nauk SSSR, Doklady, vol. 168, May 21, 1966, p. 687-690. 5 refs. In Russian.

Discussion of a model for simulating the color vision of man. The model is based on two photocells, each of which possesses a positive and a negative photoconductivity. Certain anomalies exhibited by the model are classified and described. The properties of the model are compared with certain properties of human color vision.

V. P.

A66-33844 =

CAPABILITY OF SUSTAINING EXTREME ACCELERATIONS AFTER EXPOSURE TO IONIZING RADIATION [PERENOSIMOST' EKSTREMAL'NOGO USKORENIIA POSLE VOZDEISTVIA IONIZIRUIUSHCHEI RADIATSI].

B. I. Dan'ylov.

Akademiia Nauk SSSR, Doklady, vol. 168, May 21, 1966, p. 691-693. 9 refs. In Russian.

Discussion of experiments in which 1690 male white mice of mixed breed were used to study the effect of high accelerations on living organisms. Quantitative estimates on the capability of the mice to sustain critical accelerations were obtained from death and survival data.

V. P.

A66-33884

PREDICTION DISPLAY - A WAY OF EASING MAN'S JOB IN INTEGRATING CONTROL SYSTEM.

R. Bernotat (Berlin, Technische Universität, Institut für Flugführung und Luftverkehr, Berlin, West Germany).

IN: PEACEFUL USES OF AUTOMATION IN OUTER SPACE; INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL, SYMPOSIUM ON AUTOMATIC CONTROL IN THE PEACEFUL USES OF SPACE, 1ST, STAVANGER, NORWAY, JUNE 21-24, 1965, PROCEEDINGS. [A66-33845 18-31]

Edited by J. A. Aseltine.

New York, Plenum Press, 1966, p. 541-549. 12 refs.

Discussion of a short-time prediction display which predicts only a few seconds in advance and which is especially applicable to stabilization problems. A method is discussed where a model with an accelerated time scale is used to get a prediction of the original system response, and the extrapolation method (through which the knowledge of the system response in the longer past is renounced and starts only from the actual movement) is considered. Some results of the extrapolating prediction are given.

B. B.

A66-33948

THE TRAINING OF TEST PILOTS.

R. A. Watts (Ministry of Defence, London, England).

Royal Aeronautical Society, Journal, vol. 70, June 1966, p. 649-655; Discussion, p. 656.

Discussion of the development of test pilots and their training. The primary and secondary tasks of the Empire Test Pilots' School are tabulated and its control and organization are reviewed. Other topics discussed include student selection, the academic syllabus, the flying syllabus, flight test instrumentation, and liaison with foreign schools and flight test establishments. In conclusion, a few disadvantages of gaining experience in this work are discussed.

M. F.

A66-33956

ECS ELEMENTS FOR LEM NEARING DELIVERY.

Roderick D. Hibben.

Aviation Week and Space Technology, vol. 84, May 30, 1966, p. 76, 77, 79, 80.

Analysis of the first flight environmental control system (ECS) for the Apollo lunar excursion module (LEM). The system is designed to maintain pressure, temperature, and relative humidity at safe levels for two astronauts inside the LEM for a 49-hr maximum time period. ECS functions and main subsystems are described, and its specifications are listed.

B. B.

A66-33993

POSITIVE AFTERIMAGE FOLLOWING BRIEF HIGH-INTENSITY FLASHES.

Norma D. Miller (Ohio State University, School of Optometry, Columbus, Ohio).

Optical Society of America, Journal, vol. 56, June 1966, p. 802-806. 9 refs.

USAF-supported research.

The time course of the decay of the positive afterimage following high-intensity flashes was measured by monocular and binocular brightness matching. The comparison field luminance was adjusted by means of crossed neutral wedges driven by a reversible motor. Density of the wedges was continuously recorded and the afterimage was tracked up to seven minutes following the flashes. Flash durations of 0.24 to 1.4 msec were used with a flash luminance of 4×10^5 lumens. With a 10° monocular bipartite photometric field, the afterimage brightness 5 sec following a 3×10^7 troland-sec flash was matched by a 10^5 troland comparison field. Photometric matches made monocularly or binocularly with an annular afterimage, 10° OD and 5° ID, concentric with a 2° centrally fixated comparison field required approximately 10^4 trolands. A 2° central afterimage matched with an annular comparison field showed no significant difference from the annular afterimage. The results for the first two minutes following the flashes for all conditions showed a linear relationship between the logarithm of the comparison field luminance and the logarithm of the time measured from the flash. (Author)

A66-34067

MAMMILLARY COMPLEX OF CAT BRAIN - ASPECTS OF QUANTITATIVE ORGANIZATION.

William J. Fry (Illinois, University, College of Engineering, Biophysical Research Laboratory, Urbana, Ill.).

Anatomical Record, vol. 154, Jan. 1966, p. 175-184. 8 refs. National Institutes of Health Grant No. B-1567; Grant No. NSG-195-62.

Description of a general method of deriving basic neuronal circuitry relations of central brain structures from values of neuron population ratios computed from accurate population data. The method is illustrated by specific examples involving the mammillary nuclei of cat brain. The paper is concerned first with the closeness of agreement of cell population values between bilaterally corresponding mammillary nuclei in the same brain and with the degree of reproducibility of the ratio of the populations of the lateral and medial nuclei of this complex from one brain to another. Second, it is concerned with illustrating in specific cases the usefulness of population ratios determined from normal and from modified brains in revealing important neuroanatomic relations.

M. F.

A66-34196

REPETITIONS IN THE POLYPEPTIDE SEQUENCE OF CYTOCHROMES.

Charles R. Cantor and Thomas H. Jukes (California, University, Dept. of Chemistry and Space Sciences Laboratory, Berkeley, Calif.).

Biochemical and Biophysical Research Communications, vol. 23, no. 3, 1966, p. 319-323. 12 refs.

Grant No. NSG-479.

Summary of evidence showing how many proteins may have evolved from comparatively short primordial peptides by the processes of duplication, deletion, and amino acid substitution due to point mutation. Since evolutionary changes mask the homology in the amino acid sequences, a method using a computer for examining polypeptide chains for regions of partial internal gene duplication has been proposed; the method determines the minimum number of nucleotides that must be altered to permit the conversion of one sequence into the other. When a homology is detected, it can be visually demonstrated by listing the amino acid sequence of one peptide directly under the amino acid sequence of the other. A third line lists the number of changes necessary in the coding triplet to convert one of the amino acids in the sequence into the amino acid present in the homologous peptide. Important examples of such homologies are demonstrated.

M. L.

A66-34198

A66-34198

EYE AIMING BEHAVIOR DURING THE SOLUTION OF VISUAL PATTERNS.

Warren H. Teichner and Leah M. Price (Tufts University, Medford; Harvard University, Cambridge, Mass.).

Eastern Psychological Association, Meeting, Atlantic City, N. J., Apr. 1965, Paper.

Journal of Psychology, vol. 62, 1966, p. 33-38.

Grant No. NaG-718.

Report on experimental studies to evaluate the possibility of using eye movement data as a means for studying nonvisual processes involved in ocular patterns. It is suggested that finding a visual pattern in an array of stimuli is a problem-solving or concept-forming task which involves successive data inputs represented by successive eye fixations. It also involves the development of a hypothesis or strategy or concept which is applied as a guide to data gathering by directing the position of the fixations. This in turn requires hypothesis testing, i.e., the subject's fixations may jump ahead or out of his data-gathering path to test a prediction, or they may retrace previous steps to verify the basis of the concept. If the subject has a perfect recall, it is assumed that he does not retrace at all, since he then verifies by memory. Thus it is suggested that eye movements that result in the obtaining of new data (forward fixations) represent a data-acquisition process, whereas recursive eye movements represent a forgetting process. The described experimental studies were conducted with and without speed stress. They also explored the effect of image blurring. The results suggest a narrowed attentional field and a heightened attention to detail with slight blurring and with mild speed stress. The same process seems to be associated with correct solutions even in the absence of stress. The results also suggest a systematic change in the problem-solving strategy from information gathering in the early time period to memory refreshing and verification in the later one. M. L.

A66-34201

SOCIETY OF ENVIRONMENTAL ENGINEERS, SYMPOSIUM ON ENVIRONMENTAL ENGINEERING AND ITS ROLE IN SOCIETY, 2ND, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON, ENGLAND, APRIL 19-21, 1966. VOLUME 1 - ENVIRONMENTAL EFFECTS ON MAN.

London, Society of Environmental Engineers, 1966. 22 p.

CONTENTS:

EFFECTS OF VIBRATION ON MAN. J. C. Guignard (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England). 11 p. 15 refs. [See A66-34202 18-05]

A66-34202

EFFECTS OF VIBRATION ON MAN.

J. C. Guignard (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

IN: SOCIETY OF ENVIRONMENTAL ENGINEERS, SYMPOSIUM ON ENVIRONMENTAL ENGINEERING AND ITS ROLE IN SOCIETY, 2ND, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON, ENGLAND, APRIL 19-21, 1966. VOLUME 1 - ENVIRONMENTAL EFFECTS ON MAN. [A66-34201 18-05]

London, Society of Environmental Engineers, 1966. 11 p. 15 refs.

Examination of the effects of vibration on man where vibration is defined as any fluctuating mechanical force which man perceives by the senses other than hearing. The quality and spectrum of vibration affecting man are outlined under five headings, including complex periodic and nonperiodic vibrations. The extent of the vibration frequency spectrum that is of physiological significance is divided into five distinct bands: (1) 0.1 to 1 cps - which provokes motion sickness if severe, (2) 1 to 30 cps, especially up to 15 cps - is especially important because it is this band in which major resonances occur in the human body, (3) 30 to 100 cps, (4) 100 to 20,000 cps, and (5) above 20,000 cps. The experimental testing and measurement of the effects of vibration on man are described. Principal effects - mechanical, physiological, psychological, and pathological - are discussed. Principles of vibration control are considered.

M. L.

A66-34204

MICRO-AEROBIC CAPABILITIES IN LAND PLANTS - OBSERVATIONS ON SURVIVAL AND GROWTH OF PLANTS SUBMERGED IN FRESH AND SALINE WATERS.

S. M. Siegel, C. Giunarro, and O. W. Daly (Union Carbide Corp., Research Institute, Tarrytown, N. Y.).

Nature, vol. 209, Mar. 26, 1966, p. 1330-1334. 17 refs.

NASA-supported research.

Investigation of the oxygen dependence of seed germination and seedling growth. The conventional theories which relate excess water and poor aeration to plant damage are questioned in the light of the observed existence of microaerobic capabilities among vascular plants native to mesic or xeric conditions. The results indicate that even submergence should not be a barrier to the survival and distribution of many species. V. P.

A66-34364

HEART AND CIRCULATION UNDER SPACE CONDITIONS.

V. V. Parin, R. M. Baevskii, and O. G. Gazenko (Institute of Physiology, Moscow, USSR).

Acta Cardiologica, vol. 20, no. 2, 1965, p. 105-129. 15 refs.

Discussion of fundamental aspects of space cardiology mainly on the basis of Soviet space research. General principles and methods of cardiological investigations during space flight are reviewed, experimental data obtained as a result of cardiological investigations during ten space flights are presented, and some considerations on the paths that may be taken for further development of space cardiology and its clinical aspects are made. M. F.

A66-34365

MEDICAL PROBLEMS OF WEIGHTLESSNESS.

Perry B. Miller (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch, Brooks AFB, Tex.).

(Texas Medical Association, Annual Session, 98th, Austin, Tex., May 1, 1965, Paper.)

Texas State Journal of Medicine, vol. 61, Oct. 1965, p. 720-724. 25 refs.

Comparison between prolonged spaceflight and prolonged bed rest, which suggests that the adverse physiologic effects of bed rest may also develop during spaceflight. The effects are a decrease in exercise tolerance, orthostatic tolerance, muscle strength, and blood volume, and an increase in urinary calcium excretion. Orthostatic intolerance has been reported after spaceflights. It is considered that until in-flight methods to protect orthostatic tolerance are perfected, use of antigravity suits may be necessary. Bicycle-type exercise and isometric exercise appear to be necessary. No method of preventing osteoporosis and its attendant hypercalciuria has been discovered. F.R.L.

A66-34368

LIFE DETECTION BY MEANS OF METABOLIC EXPERIMENTS.

Gilbert V. Levin and George R. Perez (Hazleton Laboratories, Inc., Life Systems Div., Falls Church, Va.).

American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper. 30 p. 17 refs.

NASA-Navy-supported research.

Study of the biological and engineering considerations indicating the possibility of developing an integrated life-detection instrument which incorporates important metabolism and growth experiments. The biological experiments include the detection of the metabolism of radioactive substrates and the evolution of labelled gases, detection of photosynthesis, detection of ATP by a firefly-bioluminescent assay, detection of the metabolic uptake of phosphorus, and detection of the metabolic uptake of sulfur. In addition, the instrument could make determinations of several significant physical parameters. The interrelationships of the biological experiments are discussed, and the instrumentation is considered. M. L.

A66-34369

THE AUTOMATED BIOLOGICAL LABORATORY.

William Hostetler (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).

American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper. 17 p.

Description of the concept and design of the Automated Biological Laboratory (ABL). The ABL is an assembly of physically and functionally integrated equipment and materials that can be used as needed to conduct the most productive series of exobiological experiments, based on the progressive results. It is controlled by computer routines which are subject to override commands by the investigator as the experimental program progresses. The complete system includes sampling and sample analysis, chemical processing, control, power supply, communications, and other supporting subsystems, designed for a 2-yr comprehensive Mars mission. The total data capacity of the system is 3.5×10^8 bits, based on a reliable direct-to-earth communications link. Radioisotope thermoelectric generators are used in conjunction with chemical batteries to provide a long-life, lightweight power supply. The total system weight is within the projected delivery capability of the Voyager system in the 1975-77 period.

M. L.

A66-34370 #**SAMPLE PROCESSING OF PLANETARY SAMPLES FOR LIFE DETECTION.**

Richard D. Johnson (NASA, Ames Research Center, Exobiology Div., Life Detection Systems Branch, Moffett Field, Calif.), American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper, 18 p.

Discussion of sample processing, including all operations on a soil sample between the sampling device and the instrument, and as necessary - mechanical treatment, transport, wet processing and introduction of the sample. The various facets of sample processing are illustrated by reference to existing or proposed life-detection experiments. The Automated Biological Laboratory (ABL) mode of processing is reviewed. The trade-off of versatility in processing, as required by the ABL concept, as opposed to specific solutions to problems associated with particular experiments involving spectrophotometry, growth monitoring, organic carbon detection, and gas chromatography, is considered.

M. L.

A66-34371 #**LIFE DETECTION BY VISUAL IMAGING.**

Gerald A. Soffen and Richard K. Sloan (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper, 19 p.

Presentation of the possible use of visual techniques for scientific investigations on Mars. An evolutionary strategy is presented beginning with an orbiter and ending with a microscope. Various parameters for imaging systems are discussed including filters, shutters, and imaging devices. It is shown that the use of the microscope (often considered for life detection) is a considerably more complex experiment than is usually performed in the biological laboratory. It is noted that the interpretation of the data is likely to be equivocal. The use of a microscope depends on a sampling device, a means of separating the biological fraction, and some way of discrimination. Besides staining, several ideas are suggested including a means of detecting movement. Two breadboard instruments have been developed and the test results are reported. It is concluded that visual experiments still require considerable development before they can be effectively used on planetary missions for the search of extraterrestrial life.

M. L.

A66-34372 #**DETECTION OF OPTICAL ACTIVITY AS A SIGN OF LIFE.**

John W. Westley (Stanford University, Stanford, Calif.), American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper, 11 p. 6 refs.

Approach to the detection of biological processes by establishing the presence of a steric discrimination within a system. Such discrimination is the consequence of only optically pure metabolites being built up into such polymers as enzymes and the like. Gas-liquid chromatographic (GLC) procedures have been developed to the point where important metabolites such as amino acids can be scanned for optical activity with very high sensitivity. A method using a combination of GLC and mass spectrometry is presented for the ratio-detection as well as identification of optically active compounds. Experimental results are included. The studies show

that within 24 hr of inoculating nonsterile soil with a racemic mixture of certain substrates, marked changes in the D:L ratio of the unused substrate can be detected.

M. L.

A66-34373 #**POTENTIALITIES OF THE GC/MS SYSTEM FOR THE DETECTION OF ORGANIC COMPOUNDS IN EXTRATERRESTRIAL MATERIALS.**

Klaus Biemann (Massachusetts Institute of Technology, Cambridge, Mass.), American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper, 24 p. 7 refs.

Grant No. NSG-211-62.

Dissertation on the applicability of mass spectrometry and gas chromatography in the analysis of organic compounds present in extraterrestrial bodies in order to provide basic information about life on such bodies. Results obtained in the laboratory using both terrestrial and extraterrestrial material are presented, and the problems involved in fully automated instrumentation are discussed.

M. L.

A66-34407 #**STUDY ON THE AGING OF PILOTS.**

Haruo Ikegami (Japan Air Self-Defense Force, Hamamatsu, Japan), Japanese Journal of Aerospace Medicine and Psychology, vol. 3, June 1966, p. 49-54. 8 refs. In Japanese.

Results of a study of the arterial blood pressure, visual accommodation power, vital capacity, and body weight of pilots and tower controllers. The systolic blood pressure of the pilots is found to decrease slightly in the early twenties, after which it maintains a constant level lower than the normal level, but then increases again after 40 years of age to reach the normal level. The diastolic blood pressure is found to increase gradually with age at the same rate as normal people. The accommodation of the pilots is shown to decrease at the same rate as that of normal people, while that of the controllers does not show a significant decrease with age. The vital capacity and body weight of pilots and controllers maintain constant levels until 43 and 40 years of age, respectively, after which the vital capacity decreases steeply and the body weight increases rather sharply.

A. B. K.

A66-34408 #**EFFECT OF HIGH GRAVITY ON A LIVING ORGANISM. I - PRELIMINARY REPORT.**

F. Motohayasi, S. Ando, K. Yamada, M. Okajima, K. Hori, H. Muraki, G. Mitarai, S. Takagi, A. Suzumura, T. Miwa, K. Takehara, H. Suzuki, U. Murakami, Y. Kameyama, and T. Chiba (Nagoya University, Research Institute of Environmental Medicine, Nagoya, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, June 1966, p. 55-68. In Japanese.

Study of the effect of head-to-foot accelerations of up to 10 g on rabbits. The changes in the electrocardiogram, electroencephalogram, electroretinogram, fractionation of serum protein, eye ground, and histology of the brain and the internal organs during accelerations lasting from 20 to 30 min are observed. On the basis of an analysis of these data, ischemic conditions, presumably of central origin, in certain organs and congestion of blood in the abdominal organs are demonstrated.

A. B. K.

A66-34409 #**EMERGENCY EJECTION ESCAPE IN JAPAN AIR SELF-DEFENSE FORCE.**

Norifusa Iwataki (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, June 1966, p. 69-74. 17 refs. In Japanese.

Results of emergency escape experiments using ejection seats. Out of 61 pilots participating, the rate of successful escape is found to be 80%. The minimum terrain clearance in successful ejections is found to be 90 m. It is shown that pilots receiving major injuries were ejected at air speeds above 370 km/hr or during dives, spins, or spirals. It is believed that ejectees, after descending on water, are dragged by surface winds above 5 m/sec. Spinal injuries produced by ejection shock are found mostly in the cervical region.

A. B. K.

A66-34410

A66-34410

DYNAMICS OF ASCORBIC ACID IN A BIOLOGICAL BODY UNDER PROLONGED HIGH OXYGEN EXPOSURE.

Hisashi Saiki (Tokyo Gikei University, Research Unit of Space Medicine, Tokyo, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, June 1966, p. 75-79. 5 refs. In Japanese.

Results of a study of the ascorbic-acid concentration in the urine and in the tissues of various organs of guinea pigs exposed to high oxygen concentrations. The concentration of ascorbic acid (oxidized and reduced types) in the tissues is found to be remarkably decreased in many organs, such as the adrenals and the heart, although in the liver, only the reduced type of ascorbic acid is significantly decreased. The rate of decrease in the spleen is found to be low, with the significance level also very low. In the brain no decrement is observed. The rate of excretion of the total ascorbic acid is found to be within the range of normal values and to have a tendency to decrease gradually in accordance with the progress of the oxygen poisoning. A. B. K.

A66-35023

FEEDBACK AND PSYCHOPHYSICAL VARIABLES IN SIGNAL DETECTION.

Edward C. Carterette, Morton P. Friedman, and Melvin J. Wyman (California, University, Los Angeles, Calif.).

Acoustical Society of America, Journal, vol. 39, June 1966, p. 1051-1055. 19 refs.

Research supported by the U.S. Department of Health, Education and Welfare, the Navy, and NASA.

144 observers, divided into eight groups of 18 each, were run in a two-alternative, temporal, forced-choice auditory-signal-detection task. At each of two signal intensities, four levels of information feedback were used: no feedback (NF); correct feedback on every trial (F100), on three-fourths (F75), or half (F50) of the trials, with incorrect feedback on remaining trials. The results were that (1) NF and F100 led to higher probability of correct responding P(C) than either F75 or F50 for both signal intensities; (2) P(C) for NF was higher under the higher intensity but lower under the lower intensity than for F100; (3) on trials immediately following trials on which observer's response and feedback agreed, detection rates were higher and false-alarm rates were lower than following disagreement trials, whereas these differences were close to zero for F50. It is argued that feedback leads the observer to change his criterion following disagreements. The effect of this variability is to depress the mean detectability index d' of signal-detectability theory. (Author)

A66-34454

PHYSICS AND BIOLOGY - WHERE DO THEY MEET?

Walter A. Rosenblith (Massachusetts Institute of Technology, Dept. of Electrical Engineering and Research Laboratory of Electronics, Center for Communication Sciences, Cambridge, Mass.).

Physics Today, vol. 19, Jan. 1966, p. 23-34. 9 refs. National Institutes of Health Grant No. MH-04737-05; NSF Grant No. GP-2495; Contract No. DA-36-039-AMC-03200(E); Grant No. NaG-496.

General review of the relationship between biology and the physical sciences. The motivations of biological physicists are examined and the properties of biological organization are discussed. The problem of how to use physical instruments and methods to meet the challenges of medicine and biology is studied through a discussion of the use of computers in the life sciences. The tasks that will have to be done before technologically up-to-date health systems can be engineered are enumerated. M. F.

A66-34459

RE-ASSOCIATION OF HEMOCYANINS FROM SUBUNIT MIXTURES.

E. F. J. van Bruggen and H. Fernández-Morán (Chicago, University, Dept. of Biophysics, Chicago, Ill.).

Journal of Molecular Biology, vol. 16, 1966, p. 208-211. 5 refs. Research supported by the L. Block Fund and the University of Chicago; National Institutes of Health Grants No. NB-04267; No. GM-13243; AEC Contract No. AT(11-1)-1344; Grant No. NaG-441-63.

The dissociation and reassociation reactions of hemocyanin mixtures were studied by electron microscopy. The experiments

were done, respectively, with a mixture of *Helix pomatia* and *Loligo pealei* hemocyanin (both belonging to the phylum Mollusca) and with a mixture of *Helix pomatia* (phylum Mollusca) and *Limulus polyphemus* (phylum Arthropoda) hemocyanins. After reassociation, many of the original molecular structures were observed, together with a certain amount of smaller and irregularly aggregated material. The importance of these specific reassociation reactions between hemocyanin subunits from different classes and from different phyla is discussed. (Author)

A66-34460

MACROMOL CULAR ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS AS REVEALED BY ELECTRON MICROSCOPY.

H. Fernández-Morán, E. F. J. van Bruggen, and M. Ohtsuki (Chicago, University, Dept. of Biophysics, Chicago, Ill.).

Journal of Molecular Biology, vol. 16, 1966, p. 191-207. 45 refs. Research supported by the L. Block Fund and the University of Chicago; National Institutes of Health Grants No. NB-04267; No. GM-13243; AEC Contract No. AT(11-1)-1344; Grant No. NaG-441-63.

Comparative electron microscopic studies of the structural organization of representative hemocyanins and apohemocyanins from Mollusca and Arthropoda are described. *Helix pomatia*, *Busyon canaliculatum* and *Loligo pealei* were chosen as examples of the Mollusca; *Homarus americanus* and *Limulus polyphemus* represented the Arthropoda. High-resolution electron microscopy using improved preparation techniques and instrumentation (coherent microbeam illumination) revealed new structural details in the molecules close to quaternary levels. Molluscan hemocyanins are cylindrical molecules (diameter about 340 Å, height ranging from 140 to 680 Å) built up from 3 to 12 rows of subunits. Arthropodan hemocyanins are built from a cubic monomer (105 Å) in various stages of organization which is species dependent. Molluscan hemocyanins are distinctly different from Arthropodan hemocyanins, although they seem to be built from analogous subunits. Observations indicating the possible presence of certain constituents specifically localized in the core of the Molluscan hemocyanins are discussed. A differentiated outer layer is regularly found around the hemocyanins and apohemocyanin molecules of Mollusca. It is not known whether these structures are actual components of the native molecules or are determined by the preparation techniques. Their possible presence can have significant biological implications. Reproducible differences between hemocyanins and apohemocyanins were observed only in the Mollusca and under certain conditions. The results are discussed in relation to the available biochemical and biophysical data on these highly organized macromolecular complexes. (Author)

LC ENTRIES

A66-81621

PHYSICAL ACTIVITY AND AIR TRAVEL IN CARDIAC PATIENTS [ATTIVITA FISICHE E VIAGGI IN AEREO NEI CARDIOPATICI].

G. Pasini.

Minerva Medica, vol. 57, Feb. 24, 1966, p. 687. In Italian.

The possibility of cardiac patients travelling by air depends on the type of disorder. For example, in coronary insufficiency any rapid ascent to low altitude may induce engine, therefore, oxygen inhalation and a coronary vasodilator is prescribed during flight. Air travel is forbidden in cases of anginous crises and aortic stenosis. For myocardial infarct patients, postponement of the trip for 3-6 months is advisable, however, in cases where travel is necessary, after 6 weeks. With systematic oxygenation during flight, congenital heart disease patients will not suffer any consequences. For mitral stenosis, any risk of pulmonary edema may be excluded if patients are first subjected to an effort test and preventive diuretic and cardiac tonic treatment with oxygenation during the trip. Flight is not contraindicated for stabilized rhythm or conduction disturbances, but forbidden in cases with tachycardia. Patients with arterial hypertension may fly after 2-3 months when their illness has improved.

A66-81622

QUANTITATION OF QRS AND ST SEGMENT RESPONSES TO EXERCISE.

Robert A. Bruce, John A. Mazzeella, John W. Jordan, Jr., and Elmer Green (Wash. U., Dept. of Med., Div. of Cardiol., Seattle). *American Heart Journal*, vol. 71, Apr. 1966, p. 455-466. 11 refs.

Grants PHS CD-00066-03, CD-00150-01, and HT 5022.

A new method is described for dual-track, magnetic-tape recording of the exercise electrocardiogram (ECG) and quantitative analysis of successive voltages of 100-beat samples at each workload by means of a computer of average transients. This minimizes respiratory and other distortions and facilitates objective appraisal of responses. The entire group of 57 clinically normal men exhibited progressively more depression of the ST segment with increasing workloads, and considerable restitution within three minutes of recovery from maximum exertion. Even greater ST segment changes were observed in nine of these men whose postexercise ST responses were visually classified as abnormal prior to automated quantitative analysis. Ventricular conduction time was shortened only in normal subjects; changes in QRS forces were also detected. It is concluded that more quantitative and objective appraisal of ECG responses to exercise is feasible for further studies of the pathophysiology of the ischemic responses, as well as epidemiological surveys for detection of individuals with increased risk for subsequent clinical manifestations of coronary heart disease.

A66-81623

THE CONFIGURATION OF THE P WAVE DURING MILD EXERCISE.

Hiroshi Irisawa and Issei Seyama (Hiroshima U., School of Med., Dept. of Physiol., Japan).

American Heart Journal, vol. 71, Apr. 1966, p. 467-472. 18 refs.

Grant Natl. Heart Inst. HE 06968-04; Japan. Min. of Educ. and Abbot Labs., Chicago, supported research.

A method of recording the average pattern of the P wave in the normal human electrocardiogram is described. The electrocardiogram was recorded with a tape recorder. The tape was then played back in reverse so that the SRQ spike could trigger the sweep circuit of both the cathode-ray oscilloscope and the average transient computer. Fifty consecutive P waves were either superimposed photographically on the oscilloscope screen or computed by the average transient computer. The latter method was found to be suited for the P wave during exercise. The average pattern of the P wave invariably showed two tiny notches. During exertion the amplitude of the P wave increased, the P wave assumed a rather smooth contour, and notches disappeared in some instances. The P wave of the canine heart also increased in amplitude after the intravenous administration of epinephrine. The notches on the P wave disappeared and the peaked P wave was obtained. These observations suggest that the mechanism for the increase in the P-wave amplitude during exercise might be, in part, the synchronous excitation of the bilateral atrial chambers.

A66-81624

MECHANICAL PERFORMANCE OF MYOCARDIUM FROM HIBERNATING AND NONHIBERNATING MAMMALS.

David E. Smith and Bert Katzung (Calif. U., Med. Center, Dept. of Pharmacol., San Francisco).

American Heart Journal, vol. 71, Apr. 1966, p. 515-521. 13 refs.

Grants PHS HE-07753, 5T5GM4303, FR-00122, and Am. Heart Assn. 64-G-17.

The mechanical performance of electrically driven right ventricular myocardium from guinea pig, rat, hamster, and ground squirrel was studied in vitro at temperatures from 1° to 36°C. Tissue from hibernating specimens (ground squirrels and hamsters) demonstrated significantly better performance (less diminution in isometric tension, and lower arrest temperatures) at lower temperature than did myocardium from nonhibernating species (guinea pig and rat). However, myocardium from nonhibernating hamsters was demonstrably less tolerant of low temperatures than was tissue from hibernating specimens, which suggests that a significant adaptation had taken place in individuals entering hibernation. In contrast, no significant difference between hibernating and nonhibernating ground squirrel myocardium was demonstrated. The myocardial force-frequency relationship was quite sensitive to temperature in guinea pigs and hamsters but relatively resistant in rats and ground squirrels.

A66-81625

HEMODYNAMIC AND CATECHOLAMINE CHANGES DURING A STANDARD COLD PRESSOR TEST.

Richard P. Cuddy, Harold Smulyan, John F. Keighley, Charles R. Markason, and Robert H. Eich (N. Y. State U., Upstate Med. Center, Dept. of Med., Syracuse).

(*Am. Heart Assn., 34th Sci. Sessions, Miami Beach, Fla., Oct. 23, 1961*).

American Heart Journal, vol. 71, Apr. 1966, p. 446-454. 10 refs.

Grants PHS HE-04707 and HTS-5410.

Hemodynamic and catecholamine changes in atropinized normal and labile hypertensive subjects exposed to the cold pressor test were investigated. A considerable number of subjects showed no measurable change in catecholamines during the cold pressor test; however, arterial norepinephrine

did increase in about half of the subjects studied, and showed some tendency to directionally parallel the changes in total peripheral resistance in normal subjects, but not in labile hypertensive subjects. Atropinization tended to increase the blood pressure in both groups of subjects; this increase was accounted for chiefly by increases in cardiac output in normal subjects, and by increases in total peripheral resistance in labile hypertensive subjects. In this latter group, atropine reduced the variability of the hemodynamic response to cold, and, since catecholamines were unaffected, tended to make the hemodynamic-catecholamine relationship more directional.

A66-81626

ROLE OF DICTYOSOMES IN WALL FORMATION DURING CELL DIVISION OF CHLORELLA VULGARIS.

T. Bisalputra, F. M. Ashton, and T. E. Weier (Calif. U., Dept. of Botany, Davis).

American Journal of Botany, vol. 53, Mar. 1966, p. 213-216. 12 refs.

The behavior of dictyosomes in wall formation during cell division of *Chlorella vulgaris* follows a definite pattern. During formation of the partition membrane they migrate into the equatorial plane and pair. There is a close spatial relationship between the dictyosomes and the partition membrane which, itself, may be derived from the fusion of dictyosomal vesicles. Dictyosomes also may participate significantly in the deposition of new wall material.

A66-81627

EFFECT OF ATRAZINE ON CHLORELLA VULGARIS.

F. M. Ashton, T. Bisalputra, and E. B. Risley (Calif. U., Dept. of Botany, Davis).

American Journal of Botany, vol. 53, Mar. 1966, p. 217-219. 14 refs.

Samples of a synchronous culture of *Chlorella vulgaris* were treated with: (a) atrazine, (b) atrazine+glucose, or (c) glucose. Cultures were sampled 0, 24, 48, and 72 hr. after treatment. Chlorophyll and packed cell volume were determined on each, and electron micrographs were taken. Atrazine prevented normal increase in packed cell volume and chlorophyll; this cessation of growth was counteracted by glucose. *Chlorella* utilized both the endogenous products of photosynthesis and an exogenous energy source, glucose in this instance, simultaneously. The atrazine-treated cells did not contain starch; control cells, atrazine-glucose- and glucose-treated cells did. Atrazine did not cause any observable abnormalities in cell organelles.

A66-81628

REMOTE SEQUELAE OF LUNG INJURY CAUSED BY INHALATION OF GASOLINE [SEQUELLES LOINTAINES D'UNE PNEUMOPATHIE PAR INHALATION D'ESSENCE].

J. Guillermand and G. Faure.

Société de Médecine militaire française. Bulletin mensuel, vol. 60, Feb. 1966, p. 99-106. 30 refs. In French.

A case history is reported of a Moroccan sharpshooter who presented transitory disease of the medial pulmonary lobe after siphoning gasoline from a reservoir. Ten years later, bronchiectasis was discovered in the same area along with stenosis of the medial bronchial lobe. Knowledge of these bronchial lesions indicates the necessity to revise certain ideas concerning the benignity and treatment of lung diseases caused by gasoline inhalation.

A66-81629

MUSCULAR ENZYME ACTIVITY IN THE SERUM AFTER ACUTE EXPERIMENTAL CARBON MONOXIDE POISONING [L'ATTIVITA DEGLI ENZIMI MUSCOLARI NEL SIERO DOPO INTOSSICAZIONE ACUTA SPERIMENTALE CON OSSIDO DI CARBONIO].

A. Salvadeo and W. Jedrychowski (Pavia U., Ist. di Med. del Lavoro, Italy).

Lavoro Umano, vol. 18, Feb. 1966, p. 60-64. 16 refs. In Italian.

Rabbits were subjected to acute carbon monoxide poisoning and a study was made of the activity of the following enzymes found in great concentrations in the heart and skeletal muscles: creatine phosphokinase, oxalacetic transaminases, pyruvic transaminases, and aldolases. No significant change in enzyme activity was recorded 5 and 24 hours after poisoning. Under the experimental conditions used no muscle and/or heart fiber lesions existed to determine an early increase in muscle membrane permeability for the enzymatic proteins. The possibility is considered of extending the controls in time in order to observe possible late changes, and also administering higher doses of carbon monoxide to the animals.

A66-81630

LONG-TERM CHANGES IN PROPERTIES OF THE AUTO-KINETIC ILLUSION.

Betty A. Wieland and Roy B. Mefferd, Jr. (Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Houston U., and Baylor U., Coll. of Med., Waco, Tex.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 367-369.

Large inter-individual differences were noted in latency, complexity, amount, and direction of movement reported by three sophisticated subjects exposed to the autokinetic illusion for 90 sec. on each of 120 consecutive days. Systematic changes characteristic of each subject were far too complex to permit the typical analyses found in the literature, using only the four primary directions, simple latencies, simple qualitative comparison of drawings, etc.

A66-81631

PERFORMANCE ON A SKILLED TASK AFTER PHYSICAL WORK OR IN A HIGH ALTITUDE ENVIRONMENT.

Wayne O. Evans (Fitzsimons Gen. Hosp., U. S. Army Med. Res. and Nutr. Lab., Denver, Colo.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 371-380. 15 refs.

The purpose of this experiment was to examine the effects of heavy physical work and of a high terrestrial environment on the complex psychomotor skill of pistol firing. Six subjects walked on a treadmill using the titration procedure, to four different degrees of fatigue. With instructions for either rapid or accurate firing, the subject on a light signal, got off the treadmill and fired six shots. Scores were analyzed in terms of time from the turning on of the light until the pistol was picked up, time to fire the first shot, time to fire the remaining five shots in a series, and the accuracy of all six shots. Time to fire the pistol on the first shot and time to fire the remaining five shots were affected by treatments. The effects on pistol shooting of a high terrestrial environment were studied in eight men taken rapidly from sea level to an altitude of 14,110 ft. The same general procedures were used but no fatigue was induced. High altitude increased speed of firing and decreased accuracy.

A66-81632

SEX DIFFERENCES IN THE SENSE OF TIME: FAILURE TO REPLICATE A 1904 STUDY.

Robert O. Baldwin, Donald H. Thor, and Dale E. Wright (Western Mich. U., Kalamazoo).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 398. 5 refs.

Forty male and 78 female subjects estimated four intervals (15, 30, 60, and 90 sec.) under four conditions (listening to the experimenter reading, crossing out m's, waiting, counting) by the method of verbal estimation at one of five sessions throughout the day. There were no significant sex differences in time estimates.

A66-81633

ELECTROENCEPHALOGRAPHIC DIFFERENCES BETWEEN RESTING AND MENTAL MULTIPLICATION.

Duilio Giannitrapani (Inst. for Juvenile Res., Chicago, Ill.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 399-405. 19 refs.

Grant VA P9-60.

The average frequency of 30 sec. of electroencephalogram (EEG) tracing for two states, resting and mental multiplication (thinking), was determined for 20 subjects by counting each visually detectable change in pen deflection regardless of amplitude. (1) Thinking gave higher average activity scores than resting. (2) The difference in average activity between thinking and resting was greatest in the two frontal and left temporal areas and it was significantly different from the differences in the other areas. (3) In the resting state there was a difference between left and right frontal and temporal areas (which increased while thinking) in contrast with a left-right symmetry of the other areas tested. These findings were interpreted as representing characteristic average activity for the areas and conditions tested and were offered as evidence for the differential utilization of brain areas in the given tasks.

A66-81634

ACUITY OF VISUAL PERCEPTION OF DIRECTION IN THE DARK FOR VARIOUS POSITIONS OF THE EYE IN THE ORBIT.

Leonard Matin (Columbia U., New York, N. Y.) and George Kibler (Johns Hopkins U., Baltimore, Md.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 407-420. 12 refs.

Grants NSF G-18120, GB-944, and GB-4263.

Viewing monocularly in a dark room, subjects reported the location of a 4' 100-msec. flash relative to the location of a fixation target extinguished 3 sec. earlier. In one experiment the flashes were randomly preselected from a horizontal array centered on the fixation target and the subject reported the horizontal displacement of the flash (left, right, same); fixation was either in primary position or in secondary position 34-1/2° to the right or to the left of primary position. In a second experiment the flashes were randomly preselected from a vertical array centered on the fixation target and the subject reported the vertical displacement of the flash (above, below, same); fixation was either in primary position or in a secondary position 34-1/4° above or 23-1/4° below the fixation target. JNDs (just noticeable differences) were about 20' of arc in primary position and increased considerably in all secondary positions of fixation. In the first experiment PSEs (points of subjective equality) shifted to the right as fixation position was shifted to the left; in the second experiment PSEs shifted upward as fixation position shifted downward.

A66-81635

HALLUCINATIONS OR DREAMS? A STUDY AROUSAL LEVELS AND REPORTED VISUAL SENSATIONS DURING SENSORY DEPRIVATION.

Marvin Zuckerman and T. Robert Hopkins (Albert Einstein Med. Center, Div. of Endocrinol. and Reprod., Res. Labs., Philadelphia, Pa.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 447-459. 21 refs.

Grant PHS MH-07926.

The primary purpose of the study was to assess the level of arousal prior to the time visual sensations were reported in sensory deprivation conditions. Concurrent recordings of electroencephalogram (EEG), galvanic skin response (GSR), and verbal reports were obtained from 22 female subjects who spent one hour in sensory deprivation. Ten subjects who reported experiencing visual sensations noted that they were awake or, in a few cases, drowsy at the time of their experience. Examination of their EEG records prior to the reports confirmed their impressions. Subjects who reported visual sensations made more verbal reports of other kinds, and reported more anxiety, depression, hostility, and somatic discomfort during the sensory deprivation period. The evidence does not support the "postponed dream report" explanation of reported visual sensations (RVS) phenomena.

A66-81636

AUTOKINESIS IN VISION, AUDITION AND TACTILE-KINAESTHESIS.

Gerald H. Fisher (Newcastle upon Tyne U., Great Britain).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 470.

Spontaneous illusory movements have been demonstrated experimentally in vision, audition, and tactile-kinaesthesia. It is concluded that these are similar to the visual phenomenon autokinesis.

A66-81637

MOTOR SKILLS BIBLIOGRAPHY: XLVI. PSYCHOLOGICAL ABSTRACTS, 1965, VOLUME 39, FIRST THIRD.

R. B. Ammons and C. H. Ammons.

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 471-474. 99 refs.

This is an alphabetical listing of 99 references on motor skills selected from *Psychological Abstracts*, 1965, vol. 39, First Third.

A66-81638

EFFECTS OF MANIFEST AND INDUCED ANXIETY AND EXPERIMENTER VARIABILITY ON SIMPLE REACTION TIME.

Ed L. Nash, J. G. Phelan, George Demas, and Al Bittner (Calif. State Coll., Los Angeles).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 483-487. 15 refs.

Thirty-six female introductory psychology students were placed in low, medium, or high anxiety groups based on their scores on the Taylor Manifest Anxiety Scale. Subjects were then randomly assigned to either stress or no-stress groups (Ns=18) and to one of two escorts (Es). Simple reaction times were recorded for all subjects for 10 trials. The mean reaction time (RT) was determined for each of 12 conditions and the data fed into a pre-programmed computer. Results lead to the following conclusions: (1) under stress simple RT is slower than under no stress; (2) there is no interaction in RT data among levels of manifest anxiety and the presence or absence

of stress; (3) simple RT is not affected by level of manifest anxiety; and (4) significant performance differences are observed when Es alternately administer the experimental treatment, presumably owing to an unconscious experimenter bias.

A66-81639

EFFECTS OF VISUAL OR AUDITORY DEPRIVATION ON FREQUENCY OF RESPONDING TO A LIGHT OR BUZZER.
Cabot L. Jaffee.

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 506.

An experiment was performed to investigate the relationship between light deprivation and the light reinforcement effect toward a drive for light hypothesis. Sixty subjects participated under conditions varying time of deprivation and modality (visual or auditory) deprived. No significant differences were uncovered between pairs of groups with respect to the modality deprived, duration of deprivation, and original vs. post-deprivation preferences.

A66-81640

MOTOR SKILLS BIBLIOGRAPHY: XLVII. PSYCHOLOGICAL ABSTRACTS, 1965, VOLUME 39, SECOND THIRD.

C. H. Ammons and R. B. Ammons.

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 511-514. 101 refs.

This is an alphabetic listing of 101 items on motor skills selected from *Psychological Abstracts*, 1965, vol. 39, Second Third.

A66-81641

COLD STRESS AND BLOOD COAGULATION IN THE ALBINO MOUSE [STRESS DA FREDDO E COAGULAZIONE DEL SANGUE NEL TOPO ALBINO].

G. Cittadini, V. Luppino, and G. Tomiselli (Siena U., Ist. di Radiol., Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Oct. 31, 1965, p. 1157-1159. 8 refs. In Italian.

Exposure of albino mice to cold (4°C.) caused elongation of the thromboelastographic indices *r* e *k* time to formation of first fibrin filament, elasticity of clot, and time to coagulation, although not in a significant manner. After one hour of cold exposure, elongation of *r* e *k* indices was appreciable but still not significant, but after two hours of exposure the elongation became maximal for *r* (highly significant) and *k* (significant). The values remained stationary for three hours after cold exposure and tended to decrease progressively, still remaining significantly higher than controls exposed to cold for four hours, and returned to normal levels after 12 and 24 hours. It is probable that exposure to the cold stress induced an immediate increase of steroids (alarm phase) whose maximum effect on the coagulative parameters was evident after two hours of exposure. The results demonstrate that cold stress induces a tendency of blood hypocoagulability in the albino mouse.

A66-81642

THALAMIC TRANSMISSION AND EYE MOVEMENTS DURING DEEP SLEEP [TRANSMISSIONE TALAMICA E MOVIMENTI OCULARI DURANTE IL SONNO PROFONDO].

N. Dagnino, E. Favale, C. Loeb, and M. Manfredi (Genova U., Clin. delle Malattie Nervose e Mentali, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Nov. 30, 1965, p. 1269-1271. 11 refs. In Italian.

Changes in the amplitude of responses evoked from the superficial cortical area (posterior sigmoid gyrus, lateral gyrus, medial and posterior ectosylvian gyrus) by electrical stimuli

applied to the immediate prethalamic level (medial lemniscus, optic tract, branch of lower colliculus) during deep sleep were studied in cats as related to the arousal of ocular movements. The responses evoked in specific cortical areas by prethalamic stimulation were essentially made up of a rapid positive deflection of presynaptic origin followed by a slow positive-negative deflection of postsynaptic intracortical origin. The latency times from the beginning, the mean of the radiation point, and the positive mean of the diphasic complex varied. During deep sleep the amplitude of response was constantly increased with respect to light sleep and appeared relatively variable. Irregular intervals were observed which were comparable to one or more responses of notably high amplitude. In accordance with other authors it is postulated that phasic changes of thalamic transmission during deep sleep are part of a constellation of events induced by the mechanism responsible for ocular movements. Ocular movement was observed to be constantly associated with the monophasic point of the nucleus reticularis pontis caudalis.

A66-81643

CORTICOPYRAMIDAL RESPONSES DURING THE SLEEP-WAKEFULNESS CYCLE [LE RISPOSTE CORTICO-PYRAMIDALI DURANTE IL CICLO SONNO-VEGLIA].

N. Dagnino, E. Favale, and M. Manfredi (Genova U., Clin. delle Malattie Nervose e Mentali, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Nov. 30, 1965, p. 1271-1274. 7 refs. In Italian.

The application of single electrical stimuli on the anterior sigmoidal gyrus of cats produced a response in the ipsilateral pyramidal neurons with rapid positive deflection, extremely early, (direct wave or D wave), followed by one or more positive deflections of latency or variable latency (indirect wave or I wave). The D wave with relatively modest amplitude during light sleep increased during awakening, and more so during deep sleep. On awakening from deep sleep the average amplitude of the D wave was more decreased or remained unchanged. The behavior of the 1st of the I wave was characterized by notable variation. On awakening from a light sleep, the amplitude was generally decreased but later remained unchanged. When the animal was in a deep sleep the 1st decreased upon awakening but was increased, decreased, or unchanged during deep sleep. The 2nd and 3rd of the I wave showed a relatively high amplitude during light sleep, decreasing in deep sleep and with no proper measurement obtainable during wakefulness. The direct behavior of corticopyramidal responses presents sensitive variations of amplitude during deep sleep in relation to ocular movements, especially since the average amplitude of the components of the corticopyramidal response tend to increase during ocular movements.

A66-81644

QUANTITATIVE STUDY OF ARTERIAL PRESSURE CHANGES IN THE CAT DURING VARIOUS PHASES OF THE WAKEFULNESS-SLEEP CYCLE [STUDIO QUANTITATIVO DELLE VARIAZIONI DELLA PRESSIONE ARTERIOSA NEL GATTO DURANTE VARIE FASI DEL CICLO VEGLIA-SONNO].

M. Guazzi, G. Baccelli, and A. Zanchetti (Siena U., Ist. di Patol. Med.; and Consiglio Nazl. delle Ric., Impresa di Elettrofisiol., Siena, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Nov. 30, 1965, p. 1289-1292. 6 refs. In Italian.

Grant AF EOAR 64-41; and Consiglio Nazl. delle Ric. supported research.

A study was made of the arterial pressure during the sleep-wakefulness cycle of anesthetized cats with electrodes placed

in the cerebral cortex. Registration was made of ocular movements and cervical muscular movements. Statistical treatment of the tabulated results revealed that arterial pressure, whether systolic or diastolic, decreased moderately during light sleep but decreased more conspicuously during deep sleep. Quantitative analysis demonstrated no progressive decrease of arterial pressure during light sleep until its transition to deep sleep. On the contrary, towards the end of a period of light sleep and at the moment of the onset of deep sleep there was a slight increase in pressure.

A66-81645

CHANGES IN HEART RATE DURING NATURAL SLEEP IN CATS WITH SINO-AORTIC AFFERENT PATHWAYS INTACT AND IN CATS WITH SINO-AORTIC DEAFFERENTATION [VARIAZIONI DELLA FREQUENZA CARDIACA DURANTE IL SONNO NATURALE, IN GATTI CON AFFERENZE SENO-AORTICHE INTATTE E IN GATTI CON DEAFFERENTAZIONE SENO-AORTICA].

M. Guzzetti, G. Raccelli, and A. Zanchetti (Siena U., Ist. di Patol. Med.; and Consiglio Nazl. delle Ric., Impresa di Elettrofisiol., Siena, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Nov. 30, 1965, p. 1292-1296. 9 refs. In Italian.

Grant AF EOAR 64-41; and Consiglio Nazl. delle Ric. supported research.

The high cardiac frequency values (183.4 beats/min.) found during wakefulness in cats with intact sino-aortic afferent pathways decreased significantly during light sleep (140.9 beats/min.). The beats increased notably during initial deep sleep (176.4 beats/min.) but decreased during episodes of deep sleep (125.3 beats/min.). At the end of deep sleep, cardiac activity attained higher values (179.2 beats/min.), practically identical to those at the beginning of the experiment. In sino-aortic deafferented cats during wakefulness the cardiac frequency of 211.7 beats/min. dropped to 160.8 beats/min. during light sleep, rising to 191.9 beats/min. at initial deep sleep, and decreasing to 136.2 beats/min. during minimal deep sleep. At the end of deep sleep, cardiac frequency rapidly returned to values similar to those registered during initial deep sleep (190.0 beats/min.). Tabulations are presented of the effects of sino-aortic deafferentation on regulation of cardiac frequency during sleep by statistically comparing the values of cardiac frequency observed in each sleep state in both intact and deafferented animals. In quiet wakefulness, in light sleep, and at the beginning and end of deep sleep, cardiac frequency was slightly but appreciably higher in deafferented than in intact cats.

A66-81646

PROTECTIVE ACTION OF AN INTRAVENOUSLY INJECTED LIPID EMULSION IN ACUTE HYPERBARIC OXYGEN POISONING IN RATS [L'AZIONE PROTETTIVA DI UNA EMULSIONE LIPIDICA INIETTATA PER VIA ENDOVENOSA NEEL'INTOSSICAZIONE ACUTA DA OSSIGENO IPERBARICO NEI RATTI].

F. S. Rucci and U. Satta (Sassari U., Ist. di Patol. Chir., Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Dec. 31, 1965, p. 1521-1523. 8 refs. In Italian.

Thirty-one rats were injected in the femoral vein with 3 ml. of lipid emulsion consisting of cottonseed oil, soy lecithin, sorbitol, α -tocopherol, and distilled water. After one hour they were subjected to an absolute pressure of oxygen at 3 atmospheres in a decompression chamber for three hours. As compared to control animals the administration of lipid

emulsion increased the survival of rats subjected to high oxygen pressure by 46.40%, with an overall survival in the treated animals of 93.55%. The mechanism for this protective action may be explained as an activation of lipogenesis and of the pentose pathways with a reduction of the natural antioxidant substances.

A66-81647

RESPIRATORY WORK AND VENTILATION IN PASSING FROM NASAL TO ORAL RESPIRATION [LAVORO RESPIRATORIO E VENTILAZIONE AL PASSAGGIO DALLA RESPIRAZIONE NASALE A QUELLA ORALE].

F. Saibene, P. Mognoni, and G. Sant'Ambrogio (Milan U., Ist. di Fisiol. Umana, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Dec. 31, 1965, p. 1550-1552. In Italian.

Consiglio Nazl. delle Ric. supported research.

Four subjects wearing a face mask breathed with the nose or with the mouth while performing work on a cycloergometer. Tracings of respiratory volume, respiratory flow, and endoesophageal pressure of the narices were registered with an oscillograph. From this data respiratory work and pulmonary resistance were calculated. Respiratory flow values in changing from nasal to oral breathing revealed about 2.9 liters/second for inspiratory flow and 3.2 liters/second for expiratory flow. Flow at the beginning of oral breathing was notably higher (4 l./sec.). The values for pulmonary resistance remained constant. At the time of changing from nasal to oral breathing a brisk increase in ventilation was observed, about 25% greater than that calculated during the completion of nasal breathing. Respiratory work always remained constant or tended to decrease slightly.

A66-81648

PARTIAL OXYGEN PRESSURE IN MIXED ARTERIAL AND VENOUS BLOOD DURING NORMAL OXYGEN BREATHING AND HYPOXIA IN DOGS [LA PRESSIONE PARZIALE DELL'OSSIGENO NEL SANGUE ARTERIOSO E VENOSO MISTO DURANTE LAVORO IN NORMOSSIA E IPOSSIA NEI CANI].

F. Cuttica, P. Cerretelli, F. Mangili, and J. Piiper (Milan U., Ist. di Fisiol. Umana, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, Dec. 31, 1965, p. 1556-1557. In Italian.

The behavior of partial oxygen pressure (pO_2) in mixed arterial and venous blood was studied in four dogs performing work on an ergometer (tilt +10% and speed varying from 4-6 km./hour) while breathing mixtures of 21%, 15%, and 11% oxygen. Each exercise in hypoxia was preceded by a period of breathing the hypoxic mixture for 6-7 minutes. Both mixed arterial and venous pO_2 were dependent on ergometer speed. Arterial pO_2 during hypoxia did not vary significantly in passing from conditions of rest to work, indicating that ventilation and alveolar gas exchange were not factors limiting maximum oxygen consumption. The minimum value for mixed venous pO_2 was higher when the animals breathed a mixture with the least oxygen content, indicating a reduced utilization of oxygen in extreme hypoxia.

A66-81649

THE INTERVENTION OF THE ANAEROBIC LACTIC ACID MECHANISM AS A SOURCE OF ENERGY DURING WORK AT NORMAL OXYGEN BREATHING AND HYPOXIA IN DOGS [L'INTERVENTO DEL MECCANISMO ANAEROBICO LATTACIDO COME FONTE DI ENERGIA DURANTE LAVORO IN NORMOSSIA E IPOSSIA NEI CANI].

F. Cuttica, J. Piper, F. Mangili, and P. Cerretelli (Milan U., Ist. di Fisiol. Umana, Italy; and Max Planck Inst. für Exptl. Med., Göttingen, West Germany).

Bollettino della Societa Italiana di Biologia Sperimentale, vol. 41, Dec. 31, 1965, p. 1558-1560. In Italian.

Four dogs performed work on an ergometer (tilt of +10% with speed ranging from 4-16 kilometers/hour) under normal oxygen breathing and under two different hypoxic levels (15% and 11% oxygen in breathed air). The following parameters were studied: (1) oxygen consumption by the open circuit method; (2) blood lactic acid concentration using an enzymatic method; and (3) partial oxygen pressure (pO_2) of mixed arterial and venous blood using polarography. An increase was found in blood lactic acid content ratios and in oxygen consumption which was related to work intensity. A decrease was observed in mixed venous blood pO_2 depending on the level of hypoxia. Mixed venous blood pO_2 was higher than arterial blood pO_2 . It is suggested that capillary pO_2 may be a factor limiting aerobic energy metabolism.

A66-81650

MEASUREMENT OF THE PRINCIPAL PARAMETERS OF CALCIUM METABOLISM IN MAN [MISURA DEI PRINCIPALI PARAMETRI DEL METABOLISMO DEL CALCIO NELL'UOMO].

G. C. Agnoli, O. Rimondi, G. Tarroni, S. Lenzi (Bologna U., Italy), P. Fasella (Rome U., Ist. di Biochim., Italy), C. Melandri, and C. Tossani (C.N.E.N., Bologna, Italy).

Bollettino della Societa Italiana di Biologia Sperimentale, vol. 42, Jan. 31, 1966, p. 65-68. In Italian.

For eight days measurements were made daily of calcemia, calciuria (V_u), fecal calcium (V_f), ingested calcium (V_i), and blood, fecal, and urinary radioactivity in five females receiving injections of Ca^{45} and Ca^{47} . A schematic representation was made of the pool of calcium rapidly exchanged (P), and of the unidirectional inflow and outflow of calcium from this pool. For each daily sample, fractionation along with measurements of average standard deviation and determination of maximum percentual values of the standard deviation of a single measure not above 10.6% were made. Values of specific radioactivity of blood expressed as percentage of injected radioactivity related to calcemia were adapted to a mono-exponential curve beginning the second day of calcium injection. V_u , V_f , and V_i were calculated as average weights of repeated experimental determinations and tabulated. Regression analysis of experimental data from these parameters demonstrated that in cases with $\Delta > 0$, calcemia, calciuria, or both varied in a significant way, and remained constant in cases with a balance equal to zero.

A66-81651

ANALYSIS OF THE HUMAN PILOT [ANALISIS DEL PILOTO HUMANO].

Jose M. Carballar Prado.

Revista de Aeronautica y Astronautica, vol. 25, Sep. 1965, p. 758-765. In Spanish.

The human pilot is affected by exterior stimuli such as altitude, speed, and accelerations. During flight, the pilot simultaneously tracks and observes turbulences, aircraft speed, etc. in controlling his mission and aircraft. For proper flight performance the pilot must have a keen sense of perception time, adequate neuromuscular activity, and various adaptive responses to incoming signals. The difficulties that a pilot encounters in the performance of a special job of voluntary control of a specific aircraft depends on the opinion he forms in relation to the qualities of flying the aircraft. In the design

of modern combat, experimental, and supersonic transport aircraft, a study of the pilot's opinion is of value in evaluating performance of the aircraft and pilot.

A66-81652

ADAPTATION TO DISPLACED VISION AS A FUNCTION OF DIRECTION OF HAND MOVEMENT.

Gerald Lazar (State U., New Paltz, N. Y.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 521-522. State U., N. Y. Res. Found. supported research.

Two groups of subjects adapted to prismatically displaced vision while moving their arms. The group which moved their arms vertically against a vertical target adapted more completely than a group moving their arms laterally against the same target when a trial-by-trial record was made of adaptation. However, these differences are absent when aftereffects are used as the criterion of adaptation. The findings can be interpreted to mean the background as well as the direction of hand movements is important in adaptation and that after-effects may be a poor criterion by which to assess the effects of variables on adaptation.

A66-81653

EFFECTS OF LUMINANCE CONTRAST FACTORS UPON FIGURAL AFTEREFFECTS INDUCED BY SHORT FIXATION PERIODS.

Margaret Gibb, Ivan Freeman, and June Adam (Alberta U., Calgary, Canada).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 535-541. 15 refs.

Grant Natl. Res. Council, Canada APA-99.

An experiment was designed to investigate the effects of luminance contrast factors upon the concentric circles after-effect for very short periods of fixation. The general finding was that the immediate aftereffect increased as the luminance contrast of the inducing figure increased and decreased as the luminance contrast of the test figure increased.

A66-81654

PERCEPTION OF INCLINED PLANE WHILE WALKING WITHOUT VISION.

Bryant J. Cratty (Calif. U., Los Angeles).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 547-556. 7 refs.

Grant PHS NB 05577-02S1.

One-hundred-sixty-four blind subjects and 30 blindfolded, sighted controls walked and reported their perceptions of a pathway with surface grades of 1, 2, 4 and 6° of incline and decline from the horizontal. It was found that the perception of incline and decline were independent perceptual attributes and that subjects were more sensitive to decline than to incline. The blind were more sensitive to decline than sighted controls. Various other inter-group differences between various portions of the blind population were found.

A66-81655

INDIVIDUAL DIFFERENCES IN FREE RESPONSE-SPEED.

Frank H. Farley (London U., Inst. of Psychiat., Great Britain).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 557-558. 10 refs.

The response-speed (covertly timed) of 30 subjects on a simple printing task under unstressful conditions was correlated with the Maudsley Personality Inventory extraversion scores, Manifest Anxiety Scale (MAS) scores, and need-achievement scores from the Edwards Personality Preference

Schedule. Extraversion correlated—.42 ($p < .02$) with log speed, the MAS correlated .11 and need-achievement—.20 (both nonsignificant).

A66-81656

PERSONALITY VARIABLES IN PROBABILITY-LEARNING, DECISION-MAKING, AND RISK-TAKING.

J. Ronald Gentile and Lowell M. Schipper (Pa. State U., University Park).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 583-591. 8 refs.

Grant PHS 1:F1 MH-21,734-01.

College students were preselected on the personality variables need Achievement (nAch) and manifest anxiety (Anx) to form a 3 by 3 factorial arrangement and to relate these measures to probability-learning decision-making, and risk-taking behaviors. After receiving 90 training trials on each of three green lights which had probabilities of 1/6, 1/2 and 5/6 of being followed by a red event light (probability-learning), subjects were asked to make decisions about the predictive reliabilities of these lights when they occurred in combinations or singly, while the red light was covered (decision-making). Subjects were then given a zero expected value gambling game and a double-or-nothing final bet. Neither personality variable showed a consistent relationship to probability-learning, decision-making, or risk-taking behavior according to various criteria.

A66-81657

PERCEPTION BIBLIOGRAPHY: XXVII. PSYCHOLOGICAL INDEX NO. 23, 1916.

C. H. Ammons and R. B. Ammons.

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 592-594. 82 refs.

This is an alphabetical listing of 82 references on perception selected from *Psychological Index*, no. 23, 1916.

A66-81658

NOTE ON CENTRAL AND RETINAL MECHANISMS IN THE AFTEREFFECT OF SEEN MOVEMENT.

Lionel G. Standing (Queen's U., Ontario, Canada).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 601-602. 7 refs.

A retinal origin for visual movement aftereffect is not refuted by the occurrence of interocular transfer and is supported by recent experimental results.

A66-81659

MODIFICATION OF VESTIBULAR NYSTAGMUS BY CHANGE OF TASK DURING STIMULATION.

James H. Brown (U.S. Army Med. Res. Lab., Exptl. Psychol. Div., Fort Knox, Ky.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 603-611.

The extent to which changes in task-controlled arousal can influence nystagmic output during both angular acceleration and subsequent constant velocity was examined. Two groups of 12 subjects each received a series of $16^\circ/\text{sec}^2$ angular accelerations during which alertness states were changed from mental arithmetic to reverie or vice versa at selected intervals. Analysis of variance indicated that task controlled arousal significantly influences nystagmic output both during angular acceleration and during constant velocity. This finding is at variance with predictions based on earlier work which indicated that arousal influenced nystagmic output only during the acceleration.

A66-81660

EFFECT OF SMOKING ON VISUAL SEARCH PERFORMANCE.

Dorothy M. Johnston (Boeing Co., Personnel Subsystem Labs., Seattle, Wash.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 619-622. 8 refs.

The purpose of this exploratory study was to determine what effect no-smoking or reduced smoking had on time required to find a target on static displays. Four males served as subjects in the experimental group and four in the control groups. Search performance improved 34% for a group of habitual smokers who reduced their smoking or abstained from smoking for two weeks. In contrast, search performance improved only 6% for the control group of smokers and 25% for the control group of nonsmokers. Although only a few subjects were measured, results indicate further study should be made.

A66-81661

INTER JUDGE RELIABILITY OF HUMAN FIGURE DRAWING MEASURES OF FIELD DEPENDENCE.

Frederick J. Evans and Del Schmeidler (Pa. U., and Inst. of Pa. Hosp., Philadelphia).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 630.

Grant AF-AFOSR-707-65.

Human figure drawings were used as a measure of the cognitive dimension of field dependence-field independence (psychological differentiation). A sophistication-of-body-articulation rating was made for each drawing on a five-point scale, based on form level adequacy, identity and sexual differentiation, and level of detailing. The Draw-a-Person test was administered twice to 60 college students. The 240 drawings were randomized and independently rated by two judges. The Pearson correlations between the four sets of drawings by the subjects ranged from .65 to .79 and from .65 to .77 for the two judges. The two sets of drawings for each subject correlated .75 and .77 for the two judges. The correlation between the two judges for the first set was .75 and for the second set was .79.

A66-81662

PERCEPTION BIBLIOGRAPHY: XXVIII. PSYCHOLOGICAL INDEX NO. 24, 1917.

R. B. Ammons and C. H. Ammons.

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 631-634. 86 refs.

This is an alphabetical listing of 86 references to work in perception selected from *Psychological Index*, no. 24, 1917.

A66-81663

EFFECT OF STIMULUS RANGE, DURATION, AND CONTRAST ON ABSOLUTE JUDGMENTS OF VISUAL SIZE.

W. R. Garner, George Kaplan, and C. Douglas Creelman (Johns Hopkins U., Baltimore, Md.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 635-644. 10 refs.

Contract Nonr-4010(03) and Grant NIH MH-12,140.

Two experiments on absolute judgment of visual size were carried out with variations in stimulus range of size, exposure duration, and contrast. The results indicate that the effects of all three variables are interchangeable within limited values of each, in the sense that their effects are simply additive. Thus they can be considered to form a common class of energetic

variable within limited conditions. Stimulus range has an additional effect over and above these mutual effects, however, in a manner which suggests that it influences judgmental factors as well as receptor factors in absolute judgment.

A66-81664**SOME FACTORS INFLUENCING THE THRESHOLD OF THE ELECTROCUTANEOUS STIMULUS.**

James Sheridan, Emerson Foulke, and Earl Alluisi (Louisville U., Ky.)

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 647-654. 13 refs.

Contract DA-49-193-MD-2525.

An experiment was performed to display the absolute threshold for electrical stimulation of the skin as a function of subject, the finger and the hand stimulated, and the day and time of day stimuli were administered. Thresholds were determined by a method of limits. Subject, the finger, and hand were significant sources of variation. A diurnal effect was suggested but not clearly shown. No quotidian effect was demonstrated.

A66-81665**FASTER REACTION TIME THROUGH INCREASING INTENT TO RESPOND.**

Jim D. Whitley (Calif. U., Riverside).

Perceptual and Motor Skills, vol. 22, Apr. 1966, p. 663-666. Grant PHS 12073-02.

The reaction time (RT) of 50 college men was measured under normal (N) and artificial (E) limb mass conditions. It was hypothesized that RT in condition E would be significantly faster than in N because the heavier mass would encourage a stronger conscious and willful intent, during the response foreperiod, to trigger the simple learned RT response stored in the memory motor drum. The results ($t=4.202$, $p<.05$) substantiated this hypothesis. Even though the relationship of TRs in N and E conditions was moderately large ($r=.56$), the specificity was very high, 69%; thus the possibility that two separate neuromotor programs are involved cannot be excluded. It is concluded that in a simple RT experiment the creation of a situation during the response foreperiod which increases the subject's conscious and willful intent to respond, will result in a faster RT. Also, the results support the known specificity of individual differences in performance of simple discrete motor acts.

A66-81666**INFLUENCE OF LOW-RATE FLASHING ON OPTIC NYSTAGMUS.**

F. Bergmann, A. Costin, J. Felsenstein, and M. Chaimovitz (Hebrew U.-Hadassah Med. School, Dept. of Pharmacol., Jerusalem, Israel).

Experimental Neurology, vol. 15, May 1966, p. 54-62. 8 refs.

In the rabbit, low-rate flashing (5-10/sec.) of one eye enhances the response evoked from the heterologous optic pathways by flashing, optokinetic, or electrical stimulation. Central nystagmus, elicited by the third form of excitation, is improved by intermittent photic stimulation of either retina at low frequencies, but greater enhancement is obtained by flashing of the heterologous eye. It is assumed that low-rate flashing exerts essentially an unspecific, i.e., nondirectional effect.

A66-81667**CAT RETINAL GANGLION CELL DENDRITIC FIELDS.**

J. E. Brown and Diane Major (Mass. Inst. of Technol., Dept. of Biol. and Res. Lab. of Electron., Cambridge).

Experimental Neurology, vol. 15, May 1966, p. 70-78. 16 refs.

Contract AF 33(615)-(1747); Grants AF-AFOSR-880-65 and NIH 5 R01 NB-04897-03.

Retinal ganglion cells of the cat were stained by the techniques of Golgi (silver) and Ehrlich (*in vivo* methylene blue). These neurohistological techniques presumably stained a few nerve cells completely, and hence allowed the study of the form of the dendritic expansion of the cat ganglion cells. The dendritic expansions of all the cells studied ended in one plane within the inner plexiform layer; no multistratified types of cells were seen. The dendritic fields were more or less circular with the cell bodies placed centrally. The size distribution of the dendritic fields was bimodal. Sizes between 70 and 200 μ and from 400 to 700 μ were found. It is suggested that for the cat retinal ganglion cells the size of the dendritic field is related to the size of the center region of the corresponding (physiologically determined) concentric receptive field.

A66-81668**NITROGEN DIOXIDE POISONING DUE TO METAL-CUTTING WITH OXYACETYLENE TORCH.**

W. D. Norwood, D. E. Wisehart, C. A. Earl, F. E. Adley, and D. E. Anderson (U.S. Atomic Energy Comm., Hanford Occupational Health Found., Richland, Wash.)

Journal of Occupational Medicine, vol. 8, Jun. 1966, p. 301-306. 8 refs.

Several hours after the use of an acetylene torch for metal-cutting in a poorly ventilated water main, a worker became so short of breath that he could not sleep. He reported to the plant physician 18 hr. after the exposure and an X-ray film revealed pulmonary edema. Re-enactment of the event produced a level of nitrogen dioxide of 90 p.p.m. in 40 min., the total oxides of nitrogen being in excess of 300 p.p.m. Such a level might well be expected to produce pulmonary edema. The accident was typical of the insidious action of nitrogen dioxide, which can so easily occur under some conditions and may cause death. Recognition of the latent period between exposure and the development of pulmonary edema, timely treatment with bed rest, and, if necessary, the administration of oxygen under pressure can be life-saving. A greater awareness of the sources and toxicity of nitrogen dioxide is also needed to prevent unnecessary exposure.

A66-81669**PLASMA 17-HYDROXYCORTICOSTEROID LEVELS DURING SLEEP IN MAN.**

Elliot D. Weitzman, Herbert Schaumburg, and William Fishbein (Albert Einstein Coll. of Med., Saul R. Korey Dept. of Neurol., New York City, N. Y.)

Journal of Clinical Endocrinology and Metabolism, vol. 26, Feb. 1966, p. 121-127. 32 refs.

Grant PHS NB-03356 and Epilepsy Found., Washington, D. C. supported research.

Levels of plasma 17-hydroxycorticosteroid hormone were obtained in six normal subjects during a 26-hr. period, every 4 hr. while awake and every 30 min. during a night's sleep. An electroencephalogram was obtained during the sleep period. In all subjects a series of 3-4 peak elevations of the hormone occurred during the latter half of the night's sleep. A suggestive temporal relationship between the steroid elevations and the rapid eye movement (REM) sleep periods was noted. The role of the central nervous system (CNS) in corticotrophin release and REM sleep activity is discussed.

A66-81670**INFLUENCE OF AGE ON LIVER GLYCOGENESIS IN RATS EXPOSED TO ACCELERATION STRESS.**

Jiro Oyama, Rosa Medina, and William T. Platt (NASA, Ames Res. Center, Environ. Biol. Div., Moffett Field, Calif.)
Endocrinology, vol. 78, Mar. 1966, p. 556-560. 8 refs.

Overnight-fasted rats ranging in age from 8 to 104 days were stressed by centrifugation for 2.5 or 5.0 hr. at 4.7 g. Liver glycogen, plasma corticosterone, liver glycogen synthetase, and plasma glucose were determined in stressed rats as a function of age and compared to noncentrifuged control rats. Significant increases in liver glycogen deposition occurred in centrifuged rats 18 days or older but not in younger rats. The unresponsiveness of the younger rats was attributed to their limited ability to elaborate increased amounts of adrenal corticosterone during centrifugation. Liver glycogen synthetase was increased significantly by centrifugation in selected groups of the older animals. An increase in synthetase was not a necessary step in the observed increase in liver glycogenesis in centrifuged rats. Glucose or corticosterone, either alone or in combination, administered to normal unstressed rats had no significant effect on liver glycogen synthetase activity.

A66-81671

SELECTIVE HEATING EFFECTS OF ULTRASOUND IN HUMAN BEINGS.

Justus F. Lehmann, Barbara J. DeLateur, and Donald R. Silverman (Wash. U., School of Med., Dept. of Phys. Med. and Rehabil., Seattle).

Archives of Physical Medicine and Rehabilitation, vol. 47, Jun. 1966, p. 331-339. 11 refs.

Grant VRA RT-3.

Application of ultrasound causes a selective rise of temperature resulting from selective absorption close to the bone-muscle interface. The temperature distribution throughout the soft tissues is critically dependent on the temperature of the coupling medium. At 21°C. and below, the highest temperature is near the bone. At 24°C. and above, if mineral oil is used, the highest temperature is in the superficial tissues. The temperature distribution is also critically dependent on the type of coupling medium. Thus, with water at 24°C., the highest temperature is still in front of the bone, not in the superficial tissues. Therefore, control of applicator and coupling medium temperature and selection of type of coupling medium are essential in order to obtain the desired temperature distribution.

A66-81672

ACTIVITY CHANGES OF SERUM-ENZYMES AFTER PHYSICAL LOAD [ZMENY AKTIVITY SEROVYCH ENZYMOV PO FYZICKOM ZATAZENI].

Václav Krampl, Miloslav Hubač, and Imrich Borsky.

Pracovní lékařství, vol. 18, May 1966, p. 150-153. 15 refs. In Czech.

The activity of glutamo-oxalacetic transaminase, glutamopyruvic transaminase, and aldolase in serum was investigated experimentally after physical, dynamic, and static load. The activity increased significantly immediately after work approximately on an equal value regardless of the degree and the kind of load. After a greater load, the increase peak was reached in the fifth minute; the result was significant in comparison with the initial value. In the fifth recovery minute a significant difference of activity of the enzyme investigated was observed between the smaller (7.5 kg.) and the greater (30 kg.) physical load. Based on experiments performed, it may be concluded that an increased expenditure of serum enzymes from the muscle cells to the blood occurs after work which is connected with a relative muscle hypoxia.

A66-81673

INFLUENCE OF AGE AND SEX ON THE AMOUNT AND RATE OF LEARNING TWO MOTOR TASKS.

John C. Bachman (Chico State Coll., Calif.)

Research Quarterly, vol. 37, May 1966, p. 176-186. 10 refs.

One hundred and ninety-two subjects were tested on two large muscle motor tasks in order to determine the influence of age and sex on the amount and rate of learning. One required the maintenance of immobility of a stabilometer; the other involved climbing a free standing ladder. Learning curves of six groups of male subjects and six groups of female subjects ranging in age from 26 to 50 years were obtained on the stabilometer and the free standing ladder climb. Variance analyses showed that rate of learning was not influenced by sex over the range 26 to 50 years and that it may also be independent of age over this same range. The amount of learning was unrelated to age but sex differences in learning ability in the range 26 to 50 were dependent upon the task.

A66-81674

EFFECT OF INCREASE IN PHYSICAL FITNESS ON MENTAL ABILITY FOLLOWING PHYSICAL AND MENTAL STRESS.

Bernard Gutin (New York City U., Hunter Coll., N. Y.)

Research Quarterly, vol. 37, May 1966, p. 211-220. 8 refs.

In order to test the hypothesis that an increase in physical fitness has a positive effect on the ability of individuals to perform complex mental tasks following physical and mental stress, 55 male college students were selected in random fashion from a group of students who were required to take a course in physical fitness. These students were administered a series of mental tasks following a low intensity period of physical and mental exertion. The fitness of 29 of the students was systematically increased over a 12-week period while the other 26 students acted as controls and were not registered in any physical education course. The testing procedure was repeated at the end of the 12-week period. In no between-groups comparisons did any significant differences arise in favor of the experimental groups. However, within each group a significant relationship existed between the degree of fitness improvement and the degree of mental task improvement from pretest to post-test.

A66-81675

RELATIONSHIPS BETWEEN FLEXIBILITY, ANTHROPOMETRY, AND THE SOMATOTYPE OF COLLEGE MEN.

Lloyd L. Laubach and John T. McConville (Antioch Coll., Yellow Springs, Ohio).

Research Quarterly, vol. 37, May 1966, p. 241-251. 25 refs. Contract AF 33(615)-1101.

Fourteen flexibility measurements, 63 direct and derived anthropometric measurements, and the somatotypes of 63 college men, mean age of 19.0 years, were obtained in order to assess the relationships between flexibility and anthropometric measurements, anthropometric measurements and somatotypes, and flexibility and somatotype. The correlations between the flexibility measurements and the anthropometric measurements were low and mostly insignificant. Body fat, as measured by skinfold calipers, yielded fairly high significant negative correlations with the flexibility measurements. The correlations between the flexibility measurements and somatotype were insignificant. Generally high correlation coefficients were obtained between the anthropometric measurements and somatotype.

A66-81676

EFFECTS OF PENTOBARBITAL, ACETYSALICYLIC ACID, AND RESERPINE ON BLOOD PRESSURE AND SURVIVAL OF RATS SUBJECTED TO EXPERIMENTAL STRESS.

Joseph P. Buckley, Eugene E. Vogin, and William J. Kinnard (Pittsburgh U., School of Pharm., Dept. of Pharmacol., Pa.) *Journal of Pharmaceutical Sciences*, vol. 55, Jun. 1966, p. 572-575. 13 refs.

Sodium pentobarbital (20 mg./kg. *per os* daily) and acetylsalicylic acid (ASA) (100 mg./kg. *per os* daily) failed to prevent the development of hypertension in rats subjected to the experimental stress program (flashing spotlights, audiogenic stimulation, oscillation). ASA enhanced the lethal effects of the stressors and potentiated the effects of the stress conditions on gastric mucosa. Reserpine phosphate (0.1 mg./kg. intraperitoneally daily), administered after the animals had been subjected to the stress conditions for 6 weeks, did lower the blood pressure to control levels.

A66-81677

STUDY ON THE AGING OF PILOT.

Haruo Ikegami.

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, 1966, p. 49-54. 8 refs. In Japanese.

Arterial blood pressure, visual accommodation, vital capacity, and body weight of pilots and flight tower controllers were studied with respect to age. The following results were obtained: (1) Systolic blood pressure of the pilots decreased slightly in the early twenties, and remained below normal level until it increased to normal in pilots past 40 years of age. Diastolic blood pressure gradually increased with age at the same rate as normal individuals. (2) Blood pressure of 28 pilots who started flight training in their early twenties was followed for 8 years. Systolic blood pressure continued to decrease with increasing age, while diastolic pressure did not show significant changes throughout the period. (3) Low pressure, hypoxia, oxygen inhalation, and g-force are discounted as hypotensive factors. The most possible hypotensive factor is considered to be physical training. (4) Visual accommodation of pilots decreased with age, while that of tower controllers did not decrease significantly with age. This factor suggests that aging of the lens can be prevented by proper functional training. (5) Vital capacity and body weight were constant until 42 and 40 years of age, respectively, after which the vital capacity dropped steeply and the body weight increased acutely. (6) Pilots under 40 years of age are considered physically young, but pilots of over 40 years need more physical conditioning to counteract aging.

A66-81678

EFFECT OF HIGH GRAVITY ON THE LIVING SYSTEM. I. A PRELIMINARY REPORT.

F. Motohayashi, M. Okajima, G. Mitarai, T. Miwa, U. Murakami, S. Ando, K. Hori, S. Takagi, K. Takehara, Y. Kameyama, K. Yamada, H. Muraki, A. Suzumura, H. Suzuki, and T. Chiba.

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, 1966, p. 55-68. 5 refs. In Japanese.

Changes in electroencephalogram, electrocardiogram, and electroretinogram recordings and in retinal blood vessels were observed in rabbits during positive acceleration up to 20 g for 20 to 30 minutes. Serum protein was fractionated into alpha₁- and beta-globulins. Histological observation of the brain and internal organs gave evidence of ischemia. The findings differ only slightly from those of previous investigators.

A66-81679

EMERGENCY EJECTION ESCAPE IN JAPAN AIR SELF DEFENCE FORCE.

Norifusa Iwataki.

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, 1966, p. 69-74. 17 refs. In Japanese.

Emergency escape by ejection seat was used by 61 Japanese pilots from Jan. 1, 1956, to Mar. 31, 1965. The main results were: (1) The rate of successful escape was 80%. (2) The minimum terrain clearance in successful ejections was 90 m.; two ejections under 50 m. were unsuccessful. (3) The injuries received during ejection depended on air speed (above 370 km./hr.) and attitude of aircraft (dive, spin, or spiral). (4) It is possible that ejectees after descending on water were dragged by surface wind above 5 m./sec. (5) Escape on land appeared to be more successful than escape on sea. (6) Spinal injuries produced by ejection shock appeared mostly in the cervical region.

A66-81680

DYNAMICS OF ASCORBIC ACID IN BIOLOGICAL BODY UNDER PROLONGED HIGH OXYGEN EXPOSURE.

Hisashi Saiki.

Japanese Journal of Aerospace Medicine and Psychology, vol. 3, 1966, p. 75-79. 5 refs.

The mechanisms of oxygen poisoning were studied by determining the concentrations of ascorbic acids, both oxidized and reduced types, in the urine and in several organs of guinea pigs exposed to high oxygen. The concentrations of ascorbic acid (oxidized and reduced types) in the tissues were remarkably decreased in many organs, such as adrenals and heart. In the liver, only the reduced type of ascorbic acid was significantly decreased. The decreasing rate in the spleen was low. No change was observed in the brain. The excretion rate of total ascorbic acid was in the range of normal values, but showed a tendency to decrease gradually according to the progress of oxygen poisoning. At the middle and at the end of the exposure to high oxygen, a transient increase of ascorbic acid excretion was observed. The reduced type of ascorbic acid in most urines was found in comparatively high concentration.

A66-81681

EFFECT OF ANOXIA ON TISSUE SEROTONIN CONCENTRATION IN RATS [EFFECTO DE LA ANOXIA SOBRE LA CONCENTRACION DE SEROTONINA TISULAR EN RATAS]

J. R. Monroy, A. Ramirez del Angel, P. A. Serrano, A. Lerdo de Tejada, and H. M. Zalvidar (I. N. C., Mexico, D. F.)

Archivos del Instituto de Cardiología de Mexico, vol. 35, May-Jun. 1965, p. 283-285. 6 refs. In Spanish.

Rats anesthetized with pentobarbital were exposed to anoxia and sacrificed. Serotonin content was determined in lung, heart and intestinal tissues. It was found increased in all the experimental animals. The results were attributed to the following factors: (1) reduced metabolic rate because of decreased activity of the mono-amino-oxidase (MAO) system under severe hypoxia; and (2) liberation of serotonin from natural deposits or increased biosynthesis.

A66-81682

CORONARY DISEASES AND FITNESS TO FLY [KORONARERKRANKUNGEN UND FLUGSICHERHEIT].

H. W. Kirchhoff (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).

(*Flugmed. Arbeitstagung, 7th, Fürstenfeldbruck, West Germany*).

Wehrmedizinische Monatsschrift, vol. 10, May 1966, p. 161-164. 17 refs. In German.

Flying disasters which are brought about by a cardiac infarction of the pilot are relatively rare, though some reports in the literature point towards this possibility. Based on figures obtained through autopsies, coronary sclerosis is not any more common among pilots of aircraft than other groups of people; however everything possible should be done, especially by preventive measures, to maintain the efficiency of the pilot for as long as possible. Under this heading belong careful electrocardiographic examinations, tests of circulatory function, and preventive recuperative periods.

A66-81683

BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh (Princeton U., N. J.), Wolf Vishniac (Rochester U., N. Y.), and J. P. T. Pearman (Natl. Acad. of Sci., Washington, D. C.)
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
xv+516 p. (Publication 1296).
\$7.50.

An examination was conducted of the scientific foundations and merits of the proposal to undertake the biological exploration of Mars. The principal topics reported are: the nature and origin of life, the cosmic setting, recognition of life and some terrestrial precedents, speculations concerning the Martian environment, practical means for confirming and enlarging our knowledge of Mars, unmanned and manned Martian landings, and avoiding the contamination of Mars by terrestrial organisms. It is concluded that the biological exploration of Mars merits the highest scientific priority in the national space program and that advantage should be taken of favorable exploration opportunities between 1969 and 1973.

A66-81684

WHAT IS LIFE?

Daniel Mazia (Calif. U., Berkeley).
IN: BIOLOGY AND THE EXPLORATION OF MARS
Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
p. 25-40.

The forms, substances, and processes comprehended in the idea of life are examined. Whereas all the rest of the world combats time by endurance, what is interesting about living organisms is that they survive. The idea of survival encompasses the concepts of organism, species, purpose, value, reproduction, mutation, and form. The cell as an enclosed aqueous system, enzyme catalysis, flow of matter and energy, and conservation of character by replication of genomes containing deoxyribonucleic acid are also examined as integral components of living organisms.

A66-81685

THE DEVELOPMENT OF RIGOROUS TESTS FOR EXTRA-TERRESTRIAL LIFE.

Sidney W. Fox (Miami U., Fla.)
IN: BIOLOGY AND THE EXPLORATION OF MARS.
Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
p. 213-228. 48 refs.

Whereas advanced life on Mars could be easily recognized, a molecular, borderline type of life could cause contention. Criteria of life which may be useful in determining the presence of life on Mars by terrestrially monitored instruments and tests are listed. The physical conditions on the Earth and the

likelihood of similar conditions on Mars are examined. Four possibilities for rendering life detection more rigorous (optical activity, catalytic activity, ordered macromolecules, and morphology) are considered.

A66-81686

THE ORIGIN OF LIFE.

S. L. Miller (Calif. U., San Diego) and N. H. Horowitz (Calif. Inst. of Technol., Pasadena).
IN: BIOLOGY AND THE EXPLORATION OF MARS.
Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
p. 41-69. 94 refs.

The probable origin of living organisms on Earth is examined in terms of the geological record, the formation of the Earth from a cloud of cosmic dust, the primitive reducing atmosphere, and energy sources (solar radiation, ultraviolet light, electric discharges, cosmic rays, radioactivity, and volcanoes). Synthetic processes for amino acids, purines and pyrimidines, sugars, lipids, peptides, nucleotides and polynucleotides, organic phosphates and high energy phosphates, enzymes, coacervates and microspheres, and polynucleotides capable of self-duplication are discussed. The discussion is based on conditions which are generally believed to have been present on the primitive Earth. It is assumed that the same syntheses would have taken place on Mars if the conditions were similar. This is no certain knowledge of early conditions on Mars, but it is probable that the conditions were similar to those on Earth in terms of reducing atmosphere since both planets were formed from the same cosmic dust cloud.

A66-81687

THE SOLAR SYSTEM AS AN ABODE OF LIFE.

Carl Sagan (Harvard U., Cambridge, Mass.)
IN: BIOLOGY AND THE EXPLORATION OF MARS.
Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
p. 73-113. 74 refs.

According to present ideas of stellar and planetary cosmogony, the solar system was formed by the gravitational contraction and condensation of a cloud of interstellar gas and dust. Statistically, there may be at least 10^{21} to 10^{23} other planets in the Universe, and it is possible that the origin and evolution of life are of common cosmic occurrence. A digest of theories of the origin of metabolizing, replicating systems is furnished, substantiated by experimental results. The range of planetary parameters consistent with the existence of living systems is examined, in terms of temperature and atmospheric requirements, primary solvent system, and possibility of substituting carbon by silicon or another atom in living forms. A survey of known data concerning the physical environments of the moons and planets in our solar system is included.

A66-81688

BIOLOGICAL MATERIALS IN CARBONACEOUS CHONDRITES.

Harold C. Urey and James R. Arnold (Calif. U., San Diego).
IN: BIOLOGY AND THE EXPLORATION OF MARS.
Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966.
p. 114-124. 29 refs.

The requirements for the removal of objects from the planets being very high, the carbonaceous chondrites must

have come from smaller bodies, i.e., asteroids or the Moon. The chondrites consist of several distinct types, all of which contain carbon and water, but little metal. Results of analyses of these carbonaceous chondrites are surveyed, including those which report the presence of microfossils, residue of biological material, levorotatory compounds, fatty acids, hydrocarbons, porphyrin, cytosine-like substances, and ribonucleic acid bases.

A66-81689

SIGNS OF LIFE.

Joshua Lederberg (Stanford U., Calif.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 127-140.

Mars is the prime target for a search for exobiology; it is assumed that the planet had an initial history similar to that of Earth. At present, it is not known how far its chemogeny has gone, and whether it has reached stages of biogeny (ordered macromolecules) and cognogeny (perception, computation, symbolic expression, and interpersonal communication). The boundaries and implications of negative entropy; optical activity of molecules; detection, replication, and inevitability of random error in informational macromolecules; rules of recognition of biological forms; and alertness to signals from intelligent being are examined.

A66-81690

OPTICAL ASYMMETRY.

Lubert Stryer (Stanford U., Calif.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 141-146. 21 refs.

Life as we know it rests on a high degree of steric specificity. Optical activity, i.e., asymmetry and fluctuations, as a criterion of living forms is discussed in terms of the search for extraterrestrial life. It is concluded that the absence of net optical activity virtually precludes the possibility of life possessing a degree of complexity akin to ours. The existence of primitive forms of life without optical activity is a matter of conjecture, but the possibility cannot be excluded on the basis of optical rotatory measurements.

A66-81691

THE BIOCHEMISTRY OF TERRESTRIAL SOILS.

A. D. McLaren (Calif. U., Berkeley).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 147-163. 53 refs.

The complex ecological condition of terrestrial soil, organic matter and soil structure, enzyme action, soil development, and some organic substances of soil (including organic sulfur, phosphorus, carbohydrates, and humus) are discussed in the anticipation that the surface of Mars has areas comparable to Earth soils.

A66-81692

PROPERTIES OF DESERT SOILS.

R. E. Cameron (Jet Propulsion Lab., Pasadena, Calif.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 164-186. 12 refs.

In deserts, the dearth of organisms is noticeable. Organisms have very little influence in the formation of true desert soils; therefore, in very arid areas there is very little classical soil development and no soil profiles of distinguishable horizons. Recent information on the moisture content; soil temperature; gas exchange and concentration; salt and organic matter content; cation exchange capacity; physical factors (porosity, texture, structure, bulk density; mineralogy); and variability, abundance, and distribution of microorganisms of the desert soil ecosystem is surveyed, in preparation for future exploration of the Martian surface.

A66-81693

REMOTE DETECTION OF TERRESTRIAL LIFE.

Carl Sagan, R. N. Colwell, S. Q. Duntley, V. R. Eshleman, D. M. Gates, Amron Katz, Joshua Lederberg, Harold Masursky, D. G. Rea, W. G. Stroud, Verner Suomi, and Ralph Zirkind (Calif. U., Berkeley).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 187-209. 13 refs.

At kilometer ground resolution, there is generally no sign of life on Earth, until the ground resolution is about 0.1 km. or better. At this resolution rectilinear features of intelligent origin become evident. Perhaps a few thousand randomly distributed photographs of the Earth would be required for a significant detection of life on Earth at 0.1 km. resolution; this number can probably be reduced by at least another order of magnitude for observations at 10 m. resolution. High reflectiveness in the near-infrared are indicative of the presence of vegetation, but not uniquely so. Many inorganic materials show similar behavior. Infrared reflection spectra of vegetation, obtained from high altitudes, may show characteristic absorption features due to the presence of organic functional groups. Thermal mapping and other infrared techniques may be useful in specifying biologically promising locales which are warmer or wetter than their surroundings. Other than high resolution imaging of the surface, the most reliable technique for the detection of intelligent life on Earth from satellite altitudes appears to be observations of monochromatic emission in the radio-frequency range.

A66-81694

A MODEL OF MARTIAN ECOLOGY.

Wolf Vishniac (Rochester U., N. Y.), K. C. Atwood (Ill. U., Urbana), R. M. Bock (Wis. U., Milwaukee), Hans Gaffron (Fla. State U., Tallahassee), T. H. Jukes, A. D. McLaren, Hyron Spinrad (Calif. U., Berkeley), and Carl Sagan (Harvard U., Cambridge, Mass.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 229-242. 20 refs.

A hypothetical model of the environment of Mars is presented with emphasis on the community of microorganisms

and plants which inhabit the planet. Mars may be populated by a community of microorganisms and plants which utilize sunlight as the primary energy source and catalyze a cycle of matter on the surface of the planet. Microorganisms may vary from forms which live a few millimeters below the surface in a microclimate affording some protection from ultraviolet radiation and favoring retention of water and organic matter, to shielded organisms which expose themselves on the very surface of the soil. One attractive model is the armored sarcodina, such as *Arcella* and *Diffugia*. The amoeboid attachment of such organisms to the substrate is suggested by the observation that Martian storms whirl up material from the bright areas and occasionally deposit it as a visible bright spot on a dark area, while aeolian transport of dark material has not been observed. The largest organisms on Mars may be plants which do not transpire and which lack rigid support unless they elaborate a silicious skeleton. For the Martian organism, spring begins when the rise in average temperature makes water available for photosynthesis.

A66-81695

EXOTIC BIOCHEMISTRY IN EXOBIOLGY.

G. C. Pimentel, T. H. Jukes (Calif. U., Berkeley), K. C. Atwood (Ill. U., Urbana), Hans Gaffron (Fla. State U., Tallahassee), H. K. Hartline (The Rockefeller Inst., New York City, N. Y.), E. C. Pollard (Pa. State U., University Park), and Carl Sagan (Harvard U., Cambridge, Mass.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 243-251. 6 refs.

There are three highly probable features of Mars which imply that an Earth-like biogeny would have to develop in opposition to its environment rather than in harmony with it (1) extremely short supply of water, (2) exposure of organisms of solar ultraviolet light in lethal 1700-3000 Å range, and (3) average surface temperature of 180-300°K. (-93° C. to +27° C.). In non-terrestrial, or exotic, biochemistry, the capabilities of information storage and transfer, energy storage and transfer, and reasonable synthetic routes toward biochemically important, informationally significant molecules from available starting materials should be considered. The possibilities and rates of synthesis of sulfur, silicon, and nitrogen compounds are explored in the light of temperature factors on Mars.

A66-81696

HIGHER ORGANISMS ON MARS.

Carl Sagan (Harvard U., Cambridge, Mass.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 252-255. 7 refs.

From astronomical evidence, it is hypothesized that there are organisms on Mars in the 10^{-2} cm. range, and that larger plants are ecologically possible. The probability of an indigenous Martian civilization is 10^{-6} , and that of a technical civilization more advanced than ours is 10^{-8} . The only serious extant argument supporting the existence of intelligent life on Mars is based on the secular acceleration for Phobos (the inner of the two Martian satellites), which, according to calculations, must be a hollow sphere, i.e., an artificial satellite, presumably launched by a now-extinct civilization.

A66-81697

SOME TERRESTRIAL PROGRAMS.

S. L. Miller (Calif. U., San Diego), G. C. Pimentel (Calif. U., Berkeley), and Carl Sagan (Harvard U., Cambridge, Mass.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 259-263.

Terrestrial preparations for the exploration of Mars include laboratory work on the chemistry of biogenesis, collection and analysis of meteorites, studies on the tolerance and adaptation of organisms to simulated Martian environment, and development of experimental methods for the definition of living forms.

A66-81698

LAUNCH OPPORTUNITIES AND SEASONAL ACTIVITY ON MARS.

Carl Sagan (Harvard U., Cambridge, Mass.) and J. W. Haughey (NASA Headquarters, Washington, D. C.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 283-291. 4 refs.

The time of closest approach of Mars to Earth and the time in which the energy required for a given launching is minimal will occur in 1969 and 1971, and will not recur until 1984. Only in 1969 will a minimum-energy trajectory lead to arrival at a time appropriate to study the southern hemisphere darkening wave. The northern wave of darkening may be observed in 1973; and in 1971 and 1975, the high contrast third of the wave of darkening in the southern and northern hemispheres, respectively, may be studied. Tables are given for launch conditions (1969-1977) for Mars and Saturn V capabilities for Martian missions.

A66-81699

SPACE VEHICLES FOR PLANETARY MISSIONS.

Elliott C. Levinthal (Stanford U., Calif.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 292-322.

Launch vehicles capable of planetary missions include those ranging in size from Atlas-Agena (capability of injecting spacecraft of 500-600 lbs.) to Saturn V (capability of up to 60,000 lbs.). The engineering problems (weight, power, and communications) inherent in fly-by missions, planetary entry probes, and lander missions are examined in the context of the search for extraterrestrial life. Tables of launch and communication capabilities, cost, weight, data transmitted, and lifetime are presented for the vehicles Atlas-Centaur, Titan IIIC, Saturn IB, and Saturn V.

A66-81700

POTENTIAL YIELDS OF BIOLOGICAL RELEVANCE FROM REMOTE INVESTIGATIONS OF MARS.

Carl Sagan (Harvard U., Cambridge, Mass.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 264-282.

The most useful techniques for the remote investigation of Mars seem to be ultraviolet spectroscopy and polarimetry; near infrared cartography and radiometry; and microwave cartography, polarimetry, and spectroscopy. The resolution and capability of the techniques are discussed individually. Although the direct detection of life on Mars from an orbiter vehicle is unlikely, there are promising possibilities for detecting biologically relevant phenomena and surface phenomena which may be due to the activities of Martian organisms.

A66-81701

BIOLOGICAL OBJECTIVES AND STRATEGY FOR THE DESIGN OF A SPACE VEHICLE TO BE LANDED ON MARS.

D. A. Glaser (Calif. U., Berkeley).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 325-330.

Detectors for life on Mars should include instruments capable of establishing the presence of biochemical substances found in terrestrial organisms as well as unusual forms of life. Detectors of unusual forms would have to depend more on general properties such as morphology, dynamics, thermodynamics, ecological manifestations, motion, and response to stimulating signals. The use of a computer on board the spacecraft is suggested to correlate, organize, and program the experimental operations and data transmission. A probable sequence of operation for a Martian expedition includes the stages of physical observation, collection, and testing of samples of Martian surface.

A66-81702

THE AUTOMATED BIOLOGICAL LABORATORY.

D. A. Glaser (Calif. U., Berkeley), John McCarthy (Stanford U., Calif.), and Marvin Minsky (Mass. Inst. of Technol., Cambridge).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 331-346.

The problem is examined of coordinating small scientific equipment to permit the adjustment of many biological techniques into an automated biological laboratory (A.B.L.) in order to determine the presence of life of Mars or the state of the planet's chemical evolution. The following topics are treated: the state-of-the-art in computer control; description of a simple automated laboratory; control of the laboratory from the Earth; television systems, transmission of pictures, and the problems and uses of computer picture pattern recognition; sample collection and the computer-controlled hand; the advantages and the problem of making the A.B.L. mobile; and some recommendations for research and development projects which may be undertaken now to provide support for the A.B.L.

A66-81703

ANALYTICAL METHODS FOR LANDERS.

D. G. Rea (Calif. U., Berkeley).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 347-426. 127 refs.

A list of techniques considered most fruitful for the detection of extraterrestrial life are discussed with respect to limits of sensitivity, constraints on type of sample, and requirements for sample preparation and treatment. The techniques listed are: separation methods and sample preparation, atomic spectroscopy, neutron activation analysis, electron and X-ray fluorescence, X-ray diffraction, sensitivity of fibers to the physical and chemical environment, gas chromatography, mass spectrometry, infrared spectroscopy, ultraviolet and visible spectroscopy, fluorimetry, optical shifts in dye complexes, nuclear magnetic resonance and electron paramagnetic resonance, colorimetry, optical microscopy, electron microscopy, and electron-optical techniques. When considering morphological criteria for the existence of extraterrestrial life, motility, change in form, and complexity of structure should be evaluated.

A66-81704

THE USE OF MARTIAN MATERIALS IN THE SEARCH FOR MARTIAN LIFE.

Alexander Rich (Mass. Inst. of Technol., Cambridge).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 427-430.

During Martian exploration, an appropriate solvent would be collected from the environment, isolated, concentrated by chemical means, and substituted for terrestrial water in inoculation experiments to detect metabolic activity.

A66-81705

THE IMPACT OF MANNED SPACEFLIGHT ON THE EXO-BIOLOGY PROGRAM.

N. H. Horowitz (Calif. Inst. of Technol., Pasadena).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 433-435.

On the assumption that it would take years of Martian exploration by automated spacecraft to uncover what could be learned in a few months of study of returned samples in laboratories on Earth, round-trip, manned missions to Mars are being planned. There is a risk of contaminating Mars with terrestrial organisms and a corresponding risk of contaminating Earth with Martian organisms. In both cases, specific precautions should be taken. If manned flights are not feasible, an alternate plan should be formulated to study exobiology by taking full instrumental advantage of unmanned flights.

A66-81706

PROSPECT FOR MANNED MARS MISSIONS.

Elliott C. Levinthal (Stanford U., Calif.).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 436-442. 7 refs.

Planned types of Martian missions, time period during which they might occur, rough cost estimate, and relationship of the program to other N.A.S.A. programs are surveyed. Three classes of manned planetary missions are being considered: round-trip fly-bys, orbiters, and landers, each of which would

contain a surface launch and an orbital launch vehicle. A specific fly-by mission is described which requires a two-stage nuclear booster for the orbital launch vehicle. Several engineering difficulties and feasibility studies for manned orbiter missions and manned Mars landers are presented. The need of a fly-by mission is stressed, as a realistic training flight to serve as a bridge from unmanned probes and manned near-Earth missions to the first manned planetary stopovers.

A66-81707**"BACK CONTAMINATION" AND QUARANTINE PROBLEMS AND PERSPECTIVES.**

A. H. Brown (Pa. U., Philadelphia).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 443-445.

There is a possibility of terrestrial contamination by exotic life forms brought back from planetary expeditions, from which serious consequences might ensue. As a preventive measure, all astronauts and all persons who come in contact with them should be strictly quarantined for some time and any returned planetary sample should be examined under conditions of rigid biological and chemical isolation. In the case of a Martian mission, the period of strict quarantine for personnel has been tentatively set at three weeks.

A66-81708**STERILIZATION AND CONTAMINATION: THE NATURE OF THE PROBLEM.**

K. C. Atwood (Ill. U., Urbana).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, p. 449-462.

The results of projected scientific investigations on Mars are potentially so important that even a remote possibility of invalidating such results should be avoided. Hence a sterilization program is necessary until it becomes more certain that contamination would not have undesirable effects. On the basis of current beliefs concerning average Martian conditions, contamination with terrestrial microbes does not seem likely to have significant effects. This fact in no way relieves us of the responsibility to avoid contamination of the planet for the present.

A66-81709**THE OBJECTIVES AND TECHNOLOGY OF SPACECRAFT STERILIZATION.**

Lawrence B. Hall (NASA Headquarters, Washington, D. C.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 463-466.

In order to avoid the contamination of Mars by terrestrial organisms, four stages are proposed: (1) develop flight hardware which remains reliable after heat or radiation sterilization; (2) reduce the biological loading of the lander to a low level during manufacture and assembly; (3) sterilize the surface and inside after assembly; and (4) protect the spacecraft from recontamination during testing and launch. The feasibility and problems of heat sterilization are examined.

A66-81710**SPACECRAFT STERILIZATION.**

N. H. Horowitz (Calif. Inst. of Technol., Pasadena).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 467-469.

The chance that a spacecraft will contaminate Mars with terrestrial microorganisms is a function not only of the number of bacteria carried to the planet, but also of their location within the spacecraft. Bacteria on exposed surfaces have a better chance of contaminating the planetary surface, but, fortunately, such bacteria are easily accessible to bactericidal agents such as ethylene oxide. Organisms within the spacecraft can only be killed by heat or some other drastic treatment, but they can be released from components only by fragmentation of the components. An assessment is made of the risk involved if interplanetary spacecraft were subjected only to ethylene oxide sterilization.

A66-81711**DECONTAMINATION STANDARDS FOR MARTIAN EXPLORATION PROGRAMS.**

Carl Sagan (Harvard U., Cambridge, Mass.) and Sidney Coleman (Calif. U., Los Angeles).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 470-481, 17 refs.

To avoid biological contamination of Mars by terrestrial microorganisms on unsterilized landing vehicles, the number of viable microorganisms, σ , deposited on the surface of Mars by each entry spacecraft must be kept at a low value. Values of σ between 10^{-4} and 10^{-3} are provisionally recommended. Not all the viable microorganisms contained in a lander are distributed over the surface upon or after impact; but further study is required before the acceptable number of viable organisms per spacecraft can be reduced below σ . So that accidental impact of unsterilized fly-bys of orbiters does not contaminate the planet, the probability of accidental impact should be kept less than 4×10^{-5} . Several experiments should be performed to estimate more precisely the permissible contaminant loads and impact probabilities. The development of emergency terminal sterilization and trajectory-control devices is recommended.

A66-81712**THE SPECIAL PROBLEM OF ENCAPSULATED CONTAMINANTS.**

A. H. Brown (Pa. U., Philadelphia).

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 482-484.

The risk of contaminating Mars by encapsulated organisms is uncertain; it depends on the release of the organisms by fragmentation of the spacecraft. To prevent the possibility of contamination, the interiors and surfaces of spacecraft components must be sterilized. Sterilization by dry heat appears to be the method of choice. When it is not feasible, penetrating ionizing radiation may be efficacious.

A66-81713**INSTRUMENTATION FOR THE DETECTION OF EXTRA-TERRESTRIAL LIFE.**

Carl W. Bruch (NASA Headquarters, Washington, D. C.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 487-502.

A review is presented of the characteristics and state of development of some of the instruments which could be used for the detection of extraterrestrial life. Morphological evidence may be obtained by a high-resolution television system coupled with a vidicon microscope or an automated scanning, flying-spot, photometric microscope. Several chemical detectors are being developed, including a gas chromatograph, a miniaturized mass spectrometer, a visible spectrometer to detect optical shifts in dye complexes, an ultraviolet spectroscope, and a means of measuring the optical rotation of light: the "Multivator", "Guliver", and "Wolf Trap", which may be useful in detecting metabolic activity, growth, and reproduction, are under development.

A66-81714**POTENTIAL APPLICATION OF ELECTRON-OPTICAL METHODS TO STORAGE OF INFORMATION FOR DIRECT RETRIEVAL.**

H. Fernandez-Moran (Chicago U., Ill.)

IN: BIOLOGY AND THE EXPLORATION OF MARS.

Edited by Colin S. Pittendrigh, Wolf Vishniac, and J. P. T. Pearman.

Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, 1966, p. 503-506.

A speculative proposal is made that all information obtained during the Mars missions and other extraterrestrial missions be considerably condensed by electron optical demagnification (ratio of demagnification, 1:1,000 to 1:50,000 or more). Bits of information would be imprinted directly onto reels of ultrathin tape of silver halide, mounted on suitable resistant thin tapes, wound into a bobbin, encapsulated, and rocket-propelled back to Earth. The main operational problem would be that of retrieval.

A66-81715**MASKING AND DISCRIMINATION.**

C. E. Bos and E. de Boer (Wilhelmina Hosp., Ear, Nose and Throat Clin., Phys. Lab., Amsterdam, The Netherlands).

Journal of the Acoustical Society of America, vol. 39, Apr. 1966, p. 708-715. 19 refs.

Central Organ. for Appl. Sci. Res., Netherlands (TNO) supported research.

With the same experimental technique, two sets of related experiments were performed. In one, a band of random noise was used to mask a pure tone. In the other experiment, the intensity difference limen for the band of noise was determined. Thresholds for masking and discrimination were obtained with help of a Bekesy audiometer. A large range of bandwidths (5-12,000 c.p.s.) and five central frequencies (500, 1000, 2000, 4000, and 8000 c.p.s.) were employed. Both sets of data agree qualitatively with data appearing in the literature. From the discrimination data, it appears that, for small bandwidths, inherent intensity fluctuations of bands of noise determine the maximum intensity discrimination. These fluctuations should influence the masking situation to the same degree. The similarity of masking and discrimination thresholds in the region of small bandwidth lends support

to this prediction. Thus, it is argued that masking data should not be judged in terms of a fixed standard in order to arrive at values for the critical bandwidth. If one judges masking data in terms of the discriminatory power that the ear exhibits for the masking noise employed, one arrives at critical-bandwidth data much more in line with generally accepted data. The accuracy with which these can be determined is so poor that one should consider masking experiments of this kind as totally unsuited to measure the critical bandwidth.

A66-81716**EFFECT OF PROLONGED EXPOSURE TO A BINAURAL INTENSITY MISMATCH ON THE LOCUS OF A DICHOTICALLY PRODUCED TONAL IMAGE.**

Lloyd Elfner and David R. Perrott (Kent State U., Ohio).

Journal of the Acoustical Society of America, vol. 39, Apr. 1966, p. 716-719. 10 refs.

NIH supported research.

An experiment is reported on the effect of six consecutive 21-min. periods of exposure to frequencies of 700, 1000, or 3000 c.p.s., dichotically presented with a 50-db. interaural intensity imbalance, on the subsequent locus of the dichotically produced auditory image of the same frequencies. Significant differences in the locus of the auditory image were found among the test frequencies. There was a differential effect on the locus of the image of the test frequencies as a function of the frequency of the saturation tone. No significant changes were noted in the sensitivity of the auditory system to the frequencies employed. No changes in pitch were reported, although pre-experimental instructions did not direct attention to this phenomenon. The results are discussed in terms of several theoretical models for localization.

A66-81717**INTERAURAL PHASE EFFECTS IN THE MASKING OF SIGNALS OF DIFFERENT DURATIONS.**

David M. Green (Pa. U., Dept. of Psychol., Philadelphia).

Journal of the Acoustical Society of America, vol. 39, Apr. 1966, p. 720-724. 15 refs.

NIH and NSF supported research.

The detectability of a pulsed, 250-c.p.s. sinusoid in noise was measured under three interaural phase conditions and at three durations. The conditions were (1) signal and noise in one ear only, $S_m N_m$, (2) signal in one ear and the same in-phase noise in both ears, $S_m N_o$, and (3) signal in both ears, but with a 180° phase difference, and the same in-phase noise in both ears $S_o N_o$. The detectability of the signal was about 9 dB. better in Condition 2 than in Condition 1, and about 7 dB. better in Condition 3 than in Condition 2. The difference in detectability is slightly dependent on signal duration, the largest difference appearing at the shortest duration. The psychometric functions were essentially the same in all conditions, except for an attenuation constant. The results are contrasted with two theories used to account for the binaural effects; some discrepancy between both theories and the results are noted.

A66-81718**POWER-GROUP TRANSFORMATIONS UNDER GLARE, MASKING, AND RECRUITMENT.**

S. S. Stevens (Harvard U., Lab. of Psychophys., Cambridge, Mass.)

Journal of the Acoustical Society of America, vol. 39, Apr. 1966, p. 725-735. 21 refs.

A masking stimulus, either visual or auditory, raises the exponent of the psychophysical function relating sensation

to stimulus. This power transformation applies only to the part of the function that is influenced by the masking stimulus. Since a given masking noise affects only weaker stimuli, the result is a discontinuous loudness function, which resembles the discontinuous brightness function produced by a glare. The loudness functions for low-frequency stimuli resemble those obtained under masking, as do also the recruitment functions in hard-of-hearing ears.

A66-81719

USE OF SENSATION LEVEL IN MEASUREMENTS OF LOUDNESS AND OF TEMPORARY THRESHOLD SHIFTS. W. Dixon Ward (Minn. U., Dept. of Otolaryngol., Minneapolis). *Journal of the Acoustical Society of America*, vol. 39, Apr. 1966, p. 736-740. 7 refs.

PHS supported research.

The hypothesis that equal sensation levels (SL) of stimulation give rise to equivalent loudnesses in normal observers is disproven by showing that recruitment often occurs near threshold even in normal ears. Since neither constant sound pressure levels (SPL) nor constant SL's including 0 dB SL (threshold itself), can be assumed to produce equal loudness, it is suggested that observers be equated at the most comfortable listening level (MCL).

A66-81720

PRETREATMENT WITH SELECTIVE BULBAR DEPRESSOR DRUGS ("CLOFEDIANOL" AND "FOLCODINE") AND SURVIVAL OF THE ALBINO MOUSE AFTER WHOLE-BODY IRRADIATION [PRETRATTAMENTO CON FARMACI DEPRESSORI SELETTIVI BULBARI (CLOFEDIANOLO E FOLCODINA) E SOPRAVVIVENZA DEL TOPO ALBINO ALLA PANIRRADIAZIONE].

C. Stuart, G. Cittadini, and G. Tomiselli (Siena U., Ist. di Radiol., Italy).

Bollettino della Societa Italiana di Biologia Sperimentale, vol. 41, Sep. 30, 1965, p. 1063-1064. In Italian.

The pretreatment of albino rats with 30 mg./kg. of clophendianol or with 30 mg./kg. folcodine prior to total body irradiation with 600 and 800 roentgens did not significantly affect the survival rate of animals in comparison to untreated, totally irradiated animals. It is postulated that the two drugs produced a selective depression of the central nervous system at the bulbar level and were therefore unable to affect survival. Tabulations are included of the controls and drug-treated groups, the average survival rate in hours, and standard deviations.

A66-81721

PRETREATMENT WITH SELECTIVE BULBAR STIMULANT DRUGS ("CORAMINE" AND "MICOREN") AND SURVIVAL OF THE ALBINO MOUSE AFTER WHOLE-BODY IRRADIATION [PRETRATTAMENTO CON FARMACI STIMOLANTI SELETTIVI BULBARI (CORAMINA E MICOREN) E SOPRAVVIVENZA DEL TOPO ALBINO ALLA PANIRRADIAZIONE].

C. Stuart, G. Cittadini, and G. Tomiselli (Siena U., Ist. di Radiol., Italy).

Bollettino della Societa Italiana di Biologia Sperimentale, vol. 41, Sep. 30, 1965, p. 1064-1066. 6 refs. In Italian.

One hundred twenty mice divided into three groups of 40 animals were respectively treated with distilled water (controls), 20-25 mg./kg. Coramin, and 5-10 mg./kg. Micoren. Each group was subdivided into two subgroups of 20 animals each and exposed to total body irradiation of 600 roentgens

and 800 roentgens, respectively. Exposure to 800 roentgens revealed that neither drug induced significant modification in the average survival of the animals in comparison with controls. A statistically significant radioprotective action was evident upon exposure to 600 roentgens, more so for Micoren than for Coramin.

A66-81722

ACID-BASE BALANCE DURING MUSCULAR EXERCISE [IL COMPORTAMENTO DELL'EQUILIBRIO ACIDO-BASE NELL'ESERCIZIO MUSCOLARE]

A. Gaida (Osped. Civile S. Croce, Div. Pneumol., Cuneo, Italy). *Minerva Medica*, vol. 57, Feb. 21, 1966, p. 581-585. 17 refs. In Italian.

Heavy muscular exercise was performed by three normal subjects for 20 minutes, until the maximum resistance to work was obtained. Evidence was found of acidosis of the metabolic type and also partially of the respiratory type, as shown by the slight increase in respiratory carbon dioxide, the reduction of base excess values, the reduction of plasma bicarbonates, and a pH of about 7.30. Tabulations are included of comparative studies made between normal subjects and heart- and lung-disease patients performing muscular exercise.

A66-81723

ORIGIN AND DEVELOPMENT OF EJECTION APPARATUS FOR MODERN AIR COMBAT CREWS [GENESI E SVILUPPO DEI DISPOSITIVI AD EIEZIONE PER GLI EQUIPAGGI DEI MODERNI AEREI DA COMBATTIMENTO].

Ferdinando Sguerri.

Rivista Aeronautica, vol. 42, Apr. 1966, p. 537-557. In Italian.

The brutal ejection of pilot George F. Smith from a F-100 aircraft in February 1955 indicated that much improvement in aircraft ejection systems was necessary. Various ejection seat tests using American, German, and English combat aircraft are reviewed. These seats were modified to protect the pilot against aerodynamic forces during high speed, high altitude jumps. Discussion is included on the construction of modified ejection seats, their first post-war use, the problem of survival during high altitude (25,000-30,000 ft.) ejection due to anoxia, ejection in supersonic aircraft, and ejection at zero altitude and zero speed "zero-zero lanyard". Some types of seats include an automatic sequence with parachute containing a small oxygen tank, others a mechanical barometric apparatus for automatic opening of the parachute. A system for expulsion of the capsule containing the pilot-seat, instruments, etc. is described and evaluated.

A66-81724

OBSERVATIONS CONCERNING DETOXICATION OF HEMOGLOBIN IN MAN EXPOSED EXTENDEDLY TO CARBON MONOXIDE [OSSERVAZIONI IN TEMA DI DETOSSICAZIONE DELL'EMOGLOBINA NELL' UOMO ESPOSTO A RISCHIO PROLUNGATO DA OSSIDO DI CARBONIO].

L. Crosetti, G. F. Rubino, and L. Pettinati (Torino U., Ist. di Clin. Med. e Terapia Clin., Italy).

Minerva Medica, vol. 57, Jan. 27, 1966, p. 268-269. In Italian.

Acute carbon monoxide poisoning in modern industry is an exceptional occurrence, with 100 parts per million of carbon monoxide being the maximum acceptable concentration in the work area. To evaluate any occupational risk of carbon monoxide poisoning, spectrophotometric examination

is made to determine the level of carboxyhemoglobinemia in subjects exposed to carbon monoxide during work. In non-exposed persons and in non-smokers the average values of carboxyhemoglobinemia are 1.05%, with extreme values between 0 and 2.30%. Smokers exhibit higher average values (2.18%) and aggravate the problem of occupational carbon monoxide poisoning. Studies made on smokers and non-smokers exposed to carbon monoxide daily during work revealed normal values for carboxyhemoglobinemia after minimal daily inhalation. In smokers the level of carboxyhemoglobinemia after minimal daily exposure varied in accordance with the degree of smoking.

A66-81725

VISUAL AIDS IN AIRPORTS FROM THE FIRST NIGHT FLIGHTS TO THE MOST RECENT ORIENTATION DEVICES FOR FLIGHTS UNDER CONDITIONS OF LOW VISIBILITY [GLI AIUTI VISUALI AEROPORTUALI DAI PRIMI VOLI NOTTURNI AI PIU' MODERNI ORIENTAMENTI PER IL VOLO IN CONDIZIONI DI BASSA VISIBILITA].

Nerio Memma

Rivista Aeronautica, vol. 42, Feb. 1966, p. 179-213. In Italian.

Various means used to illuminate airport landing fields during night flights are reviewed beginning with landing lights of 18 KW used in 1938, progressing to the use of red light signals, and yellow-orange light points situated within the landing vicinity. Development of a so-called catenary to aid in landing is mentioned along with runway flares and navigation lights. Discussion is presented of normal landing maneuvers performed by the pilot and of maneuvers to be used under various conditions of low visibility. Diagrams of these maneuvers are included. The light path of runway approaches in relation to aircraft height, speed, and visibility is described in terms of the development of proper warning lights. Orientation devices such as the two-color (white-red) System or Visual Approach Slope Indicator System are diagrammed and evaluated. An All-Weather Operation Panel has been developed which subdivides meteorological conditions and visibility into category I (60 m. of ceiling and 800 m. of visibility); category II (60-30 m. of ceiling and 800-400 m. of visibility); and category III (minimum visibility up to 210 m.). Illumination under these conditions is discussed. Mention is made of the Fog Intensive Dispersal Off device and the Horizontal Flight Director Indicator used to aid low visibility flight, and lighting at Linate-Minalto and Orly airports.

A66-81726

CLINICAL ASPECTS OF INTERPLANETARY FLIGHTS [KLINICHESKIE ASPEKTY MEZHPLANETNYKH POLETOV]. V. V. Parin, E. B. Zakrzhevskii, and R. M. Baevskii.

Klinicheskaya Meditsina, vol. 43, Feb. 1965, p. 3-6. In Russian.

Although careful selection of astronauts precludes the possibility of serious organic diseases during space missions, consideration should be given to illness caused by: (1) conditions of limited space in the spacecraft, such as sanitation, nutrition, and lack of exercise; (2) outer space conditions, such as cosmic radiation, electromagnetic fields and weightlessness; and (3) diseases of endogenous origin, such as autoinfection, disturbances of the nervous system, and endocrine regulation. Emergencies may occur such as appendicitis, pneumonia, or coronary involvement, which would require immediate medical aid. The presence of a medical officer on-board, as on the Soviet Spacecraft "Voskhod", would facilitate

the intimate doctor-subject relationship, which is disrupted during telemetric on-ground medical support. The solution of medical aspects of space flight may be worked out not only through actual mission experiments and observations, but also from results received in this field in naval and polar medicine.

A66-81727

CLINICO-PHYSIOLOGICAL ASSESSMENT OF SEISMO-CARDIOGRAPHIC DATA OBTAINED DURING THE ORBITAL FLIGHTS OF "VOSTOK-5" AND "VOSTOK-6" [KLINIKO-FIZIOLOGICHESKAYA OTSENKA SEISMOKARDIOGRAFIKESKIKH DANNYKH, POLUCHENNYKH VO VREMIA KOSMICHESKIKH POLETOV KORABLEI "VOSTOK-5" I "VOSTOK-6"].

R. M. Baevskii and I. U. N. Volkov.

Klinicheskaya Meditsina, vol. 43, Feb. 1965, p. 6-12. 6 refs. In Russian.

A method which can be used for evaluating seismocardiographic data obtained during space missions of the Soviet spacecraft "Vostok-5" and "Vostok-6" is presented. The seismographic method is a variation of the dorsoventral ballistocardiography which permits the study of the force and coordination of heart beat, and the duration of separate phases of the cardiac cycles. A mathematical interpretation of the dynamics of heart compensatory reactions is given.

A66-81728

GAS EXCHANGE IN RADIATION INJURIES [GAZOVYI OBMEN PRI LUCHEVYKH PORAZHENiyakh].

N. A. Kurshakov and S. F. Severin.

Klinicheskaya Meditsina, vol. 43, Jan. 1965, p. 23-27. In Russian.

Changes in the gaseous components of blood during acute and chronic radiation sickness depend on the degree of injury. Developing anemia leads to a decrease in the blood oxygen reserve, and with the resultant anemic hypoxia, a decrease in the amount of hemoglobin and its affinity for oxygen. This state could be caused by respiratory disturbances. The hemodynamic changes lead to arterial-venous oxygen gradient variations. The drop of the arterial blood oxygen saturation in chronic cases during muscular load indicates a lack of correlation between the gas exchange and the blood flow in the lungs. In acute cases, the basic exchange may be increased until recovery phase. The presence of arterial hypoxia suggests a treatment by inhalation of oxygen or a mixture of oxygen and carbon dioxide.

A66-81729

MILITARY PILOTING AND EXPERIMENTAL PSYCHOLOGY. CONTINUATION I. [PILOTAGE MILITAIRE ET PSYCHOLOGIE EXPERIMENTALE. SUITE I].

A. de Brisson and J. Brémont.

Forces Aeriennes Francaises, vol. 20, Mar. 1966, p. 299-318. In French.

A study was made of the factors conditioning the degree of success in pilot training with emphasis on organization of programs and lessons; objectivity of notations on ground and flight instruction; teaching methods; and effect of environment and school staff on evolution of motivation, etc. Two approaches were used in the study. The first, essentially statistical, consisted of comparing training programs and individual characteristics of apprenticeship. The second, qualitative and experimental, reviewed the training program by examining each subject and reconstructing each lesson to

determine logical order. A trial interpretation is presented of the changing attitudes of military pilots using a psycho-sociological model which introduces a new variable "idealism-realism" and takes into consideration initial motivation, social pressures, and evolution of motivation of students throughout flight school. The model is based on analysis of variables permitting prediction of probabilities. In studying motivation, candidates were asked to list in order of preference the various flight specialties. The following order was obtained: (1) fighter pilot; (2) transport pilot; (3) reconnaissance pilot; (4) helicopter pilot; (5) bombardier; and (6) pilot monitor. Discussion is included on the evolution of attitudes and motivation of students in terms of social pressures.

A66-81730

HUMAN TOLERANCE TO LOW FREQUENCY SOUND.

Bob R. Alford and James F. Jerger (Dept. of Otolaryngol., Houston, Tex.)

(*Am. Acad. of Ophthalmol. and Otolaryngol.*, 70th Ann. Session, Chicago, Nov. 14-19, 1965).

Transactions of the American Academy of Ophthalmology and Otolaryngology, vol. 70, Jan.-Feb. 1966, p. 40-47.

NASA Contract NAS9-2468.

Twenty-one male subjects were exposed repeatedly to three-minute signals from two to twelve c.p.s. and 119 to 114 dB SPL. Results suggest that of the systems monitored, the auditory system is most sensitive to intense, low frequency stimulation.

A66-81731

BIOLOGICAL EFFECTS OF ATMOSPHERES CONTAMINATED BY AUTO EXHAUST.

F. G. Hueter, G. L. Contner, K. A. Busch, and R. G. Hinners (Robert A. Taft Sanit. Eng. Center, Div. of Air Pollution, Lab. of Med. and Biol. Sci., Public Health Serv., Cincinnati, Ohio). (*Air Pollution Control Assn., Ann. Meeting, Toronto, Jun. 1965*).

Archives of Environmental Health, vol. 12, May 1966, p. 553-560. 9 refs.

The chronic exposure of mice, rats, hamsters, and guinea pigs to various concentrations of irradiated and nonirradiated auto exhaust-air mixtures resulted in (1) increased susceptibility to pulmonary infection and chronic disease during the latter half of the animal's lifetime, and (2) markedly decreased mouse fertility and survival rate of infant mice. Both raw and irradiated auto exhaust caused a stress and adaptation response in mice as measured via spontaneous activity, increased bone lead concentrations, and increased amount of nonfunctional or abnormal lung tissue. No experimental atmospheric effects were observed concerning mortality; histopathology; growth-body weight; immunology; hematology restricted to erythrocyte count, erythrocyte cell size distribution, hematocrit, or hemoglobin concentration; blood O₂ and CO₂ values; oxygen consumption; or pulmonary function in relation to permanent impairment. Further studies are indicated to elucidate more fully the affected biologic parameters.

A66-81732

BIOLOGICAL EFFECTS OF SO₂ EXPOSURES ON GUINEA PIGS: A PRELIMINARY REPORT.

S. D. Lee and R. M. Danner (HEW, Public Health Serv., Div. of Air Pollution, Lab. of Med. and Biol. Sci., Cincinnati, Ohio). *Archives of Environmental Health*, vol. 12, May 1966, p. 583-587. 12 refs.

Experiments were conducted to establish the minimum SO₂ exposure concentration that would consistently affect

the respiration and biochemistry of guinea pigs. SO₂ exposures at concentrations above 19 p.p.m. for one hour caused an increase in tidal volume and a decrease in respiration rate, with irregular effects on minute volume. SO₂ exposures at concentrations ranging from 7 to 17 p.p.m. caused a general decrease in tidal volume and an increase in respiration rate. Hemoglobin concentrations increased after SO₂ exposure with all concentrations (7 to 310 p.p.m.) tested. Control animals showed decreased hemoglobin concentrations following a comparable test period without SO₂ exposure. Blood inorganic sulfur concentrations increased after exposures to SO₂ concentrations above 19 p.p.m. and exhibited irregular responses below 17 p.p.m. of SO₂. Control animals showed decreased blood inorganic sulfur concentrations.

A66-81733

POST-TRAUMATIC EPILEPSY AND FLIGHT PERSONNEL [EPILEPSIE POST-TRAUMATIQUE ET PERSONNEL NAVIGANT].

L. Tabusse, R. Pannier, and Cl. Parquet (Hôp. Mil. d'Instruction Dominique Larrey, Méd. Aéron., Serv. Clin., Versailles, France).

(*Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques*, Nov. 19, 1965).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 5-8. In French.

Epileptic seizures following cranial trauma in two pilots and one navigator are described. Electroencephalograms showed no impending attack in any subject. Epileptic seizures following cranial trauma are proportional to the severity of the injury and can be expected in 25-40% of the cases, within five years. Following the initial seizure, a high rate of chronic epilepsy may result (up to 83%), hence flight personnel should be permanently grounded.

A66-81734

MORPHOLOGICAL AND METABOLIC CHANGES OBSERVED EXPERIMENTALLY UNDER THE EFFECT OF HIGH FREQUENCY ELECTROMAGNETIC FIELDS [MODIFICATIONS MORPHOLOGIQUES ET METABOLIQUES OBSERVEES EXPERIMENTALEMENT SOUS L'ACTION DES CHAMPS ELECTRO-MAGNETIQUES HYPERFREQUENCE].

L. Miro, R. Loubière, and A. Pfister (Centre d'Enseignements et de Rech. de Méd. Aéron., Paris, France).

(*Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques*, Dec. 17, 1965).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 9-13. In French.

Comm. à l'Energie Atomique supported research.

As measured by S³⁵ methionine incorporation, 160 hours of exposure to high frequency electromagnetic waves increased protein synthesis in mouse spleen, thymus, and liver. Reticular hyperplasia was also clearly shown. It is suggested that high frequency electromagnetic waves affect the metabolism of cells within the reticulohistiocytic system.

A66-81735

ANALYSIS OF PHYSIO-PATHOLOGICAL FACTORS OBSERVED DURING RECENT EJECTIONS [ANALYSE DES FACTEURS PHYSIOPATHOLOGIQUES OBSERVES LORS DES EJECTIONS RECENTES].

C. Nogues, P.-M. Pingannaud, J. Fabre, and A. Gibert (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France). (*Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques*, Dec. 17, 1965).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 15-17. In French.

The roles of altitude, speed, and seat configuration on injuries suffered after ejections are discussed. Of the 40 ejectees from October 1963 to October 1965, 21 were unhurt, 11 were wounded, and eight died. Ejection below 300 m. showed a greater risk than did ejection above 300 m. No definite correlation between injuries and speed was observed. Seat configuration was implicated in two cases of vertebral trauma. Nine vertebral and limb injuries occurred upon hitting the ground. Of the 10 ejections from Mirage III aircraft, five of the six seriously wounded showed lesions of the vertebral column.

A66-81736

EVOLUTION OF PERFORMANCE IN A VIGILANCE TASK AT NIGHT: EFFECT OF PREVIOUS SLEEP AND OXYGEN BREATHING [EVOLUTION DU RENDEMENT DANS UNE TACHE DE SURVEILLANCE EFFECTUEE DE NUIT EFFETS DU REPOS PREALABLE ET DE L'INHALATION D'OXYGENE].

M. Gouars, R. Angiboust, P. Galban, and R. Vedel (Centre d'Expériences Aériennes Mil. de Mont-de-Marsan, Lab. d'Etudes Méd.-Physiol., Paris, France).

(*Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques*, Dec. 17, 1965).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 18-23. In French.

Effect of previous rest and oxygen inhalation on vigilance was measured during night duty in 26 volunteers. Signal detection by control subjects during the day was statistically significantly better than at any time during the night. Two hours of rest prior to the two-hour vigilance task increased the number of signals detected, but oxygen inhalation and progress into the night decreased the number. Great individual variation in performance was observed during the day, but performance was uniformly deteriorated during the night.

A66-81737

OTOSCLEROSIS AND APTITUDE IN AIR FORCE FLIGHT PERSONNEL [OTOSPONGIOSE ET APTITUDE CHEZ LE PERSONNEL NAVIGANT DE L'AERONAUTIQUE].

L. R. Bordes.

(*Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques*, Dec. 17, 1965).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 23-25. In French.

Aptitude for flight duty after otosclerosis is determined by the degree of deafness, whether the situation has been surgically corrected, and the type of flight duty. Inaptitude is declared for all non-operated, bilaterally operated, and singly operated individuals without improvement or with deafness (>30 dB.) in the contralateral ear. If improvement appears after surgery in a single ear and the contralateral ear is intact (or with <30 dB. deafness), the individual may be apt for military transport, liaison, and helicopter duty, and for civil air transport duty.

A66-81738

OLD PULMONARY TUBERCULOSIS IN MEMBERS OF CIVIL AVIATION PERSONNEL [TUBERCULOSE PULMONAIRE ANCIENNE CHEZ LES MEMBRES DU PERSONNEL NAVIGANT DE L'AVIATION CIVILE].

J. Sais, P. Vesvel, and P. Isoard (Centre Principal d'Expertise Méd. Personnel Navigant, Paris, France).

Revue de Médecine Aéronautique, vol. 5, 1st quarter, 1966, p. 26-29. 31 refs. In French.

Forty cases of tuberculosis were uncovered among French, civil aviation personnel. Treatment was by rest (4), pneumothorax (7), antibiotics (21), and surgery plus antibiotics (8). Different amounts of recuperation time were required. Two relapses occurred.

A66-81739

MEDICAL PREVENTION OF CHRONIC ACOUSTIC TRAUMA [LEKARSKA PREVENCA CHRONICKEJ AKUSTICKEJ TRAUMY].

Stefan Kubik.

Pracovní lékařství, vol. 18, May 1966, p. 176-179. 11 refs. In Czech.

Pre-employment and follow-up hearing examinations should be made of people working in hazardous noise conditions. The examinations should be performed more often during the first year of exposure, when the individual's noise sensitivity can be determined. The repetition of examinations should be determined by the degree of noise exposure. The principles of the working replacement according to the degree of hearing damage are discussed.

A66-81740

CULTURE OF MACROPHAGES UNDER HOMOGENEOUS STATIC MAGNETIC FIELD.

M. Valentinuzzi, R. W. Ferraresi, and T. Vazquez (Inst. Nacl. de Microbiol. 'Carlos G. Malbran', Lab. de Magnetobiol., Buenos Aires, Argentina).

Experientia, vol. 22, no. 5, 1966, p. 312.

The guinea pig peritoneal cavity macrophage cultures kept in guinea pig serum with Hanks solution were exposed to various intensities of magnetic field. Samples taken every hour for four hours for macrophage count in the Neubauer chamber showed a greater number of cells in the exposed culture, as compared with the control kept in an incubator. In the first experiment the magnetic field was 4,200 or 5,650 oersteds. The temperature was either constant during the experiment, 20°C, 30°C and 37°C, or was increasing during experiment from 20°C to 32°C. The difference in the count was 27-33%. In the second experiment the field intensity was 2,000, 4,000, 6,000 and 8,000 oersteds. The control was kept in the pole gap, but without magnetic field. The temperature was maintained constant at 25°C. Different positive differences were recorded, but plotting the number of macrophages against field intensity showed the greatest difference around 4,000 oersteds. The conclusion is that magnetic field of 4,000 oersteds helps to maintain large numbers of viable cells by altering metabolism and dynamics of the culture.

A66-81741

VEGETATIVE DYSTONIA IN RADIATION INJURIES AND ITS TREATMENT [VEGETATIVNYE DISTONII PRI LUCH-EVYKH PORAZHENiiAKH I IKH LECHENIE].

I. S. Glazunov, A. A. Grafov, and V. A. Ivanov.

Klinicheskaja Meditsina, vol. 43, Aug. 1965, p. 14-18. 22 refs. In Russian.

The author reviews the literature on vegetative dystonia caused by ionizing radiation, and various methods of therapy which can be applied in specific cases. The vegetative dystonia can be vascular, visceral, endocrine, or diencephalic. The result of damage to the peripheral autonomic nervous system, branching out to various organs and tissues, causes a disturbance in neurohumoral balance which in turn affects

all phases of metabolism. The complexity of radiation sickness syndrome presents a difficult problem in selecting a proper type of therapy. A list of various treatment procedures is presented.

A66-81742

OXYGEN CONSUMPTION OF NERVOUS AND HEPATIC TISSUE OF THE RAT IN RELATION TO AGE AND PRECEDING HYPOXIA [SPOTREBA KYSLIKU V NERVOVE A JATERNI TKANI KRYSY V ZAVISLOSTI NA VEKU A NA PREDCHAZEJICI HYPOXII].

J. Mourek.

Sborník Lékařský, vol. 67, Feb. 1965, p. 45-50. 27 refs. In Czech.

Rats aged five and ten days and full grown rats were exposed for 20 minutes to hypoxia corresponding to an altitude of 7,000 m. After exposure the animals were immediately killed. Using Warburg's method changes in the oxygen consumption in slices of cerebral cortex, brain stem, and liver tissue were assessed. Hypoxia caused a detectable increase of oxygen consumption by the liver tissue and cerebral cortex in five-day-old rats, while there was a detectable decrease of oxygen consumption in the mesencephalon. In adult rats, on the other hand, as a result of hypoxia, the oxygen consumption of cerebral cortex slices and liver tissue declined, the difference being statistically significant. The oxygen consumption of the mesencephalon remained unaltered. The decline of the oxygen consumption in the hepatic tissue was significant but very small.

A66-81743

OSCILLATORY BEHAVIOR OF RESPIRATORY GAS EXCHANGE IN RESTING MAN.

L. Goodman, D. M. Alexander, and D. G. Fleming (Case Inst. of Technol., Cleveland, Ohio).

IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Apr. 1966, p. 57-64. 7 refs.

Grant NIH GM 08569-03.

The dynamics of respiratory gas exchange in resting man were studied. Spectral analyses were performed on time series representing four-hour continuous records of ventilation, carbon dioxide release, oxygen take-up, end tidal carbon dioxide concentration, and tidal oxygen concentration, and respiratory quotient. Results imply that the temporal behavior of each of these six variables can be characterized by a superposition of a finite set of self-sustained almost periodic oscillations with periods in the range from one minute to four hours and time dependent stochastic variation. In ventilation, carbon dioxide release, and oxygen take-up, individual components have amplitudes of between five and ten percent of mean values and nominal periods of one, four, ten, and twenty minutes and one and two to four hours. Components in oxygen concentration, carbon dioxide concentration, and respiratory quotient have amplitudes of between two and four percent of mean values. Periods in carbon dioxide concentration are three, ten, twenty, and thirty to forty-five minutes and two hours; in oxygen concentration, three, ten, twenty, and thirty minutes and one and four hours; and in respiratory quotient, one, five, ten, and fifteen minutes and two to four hours.

A66-81744

EXPERIMENTAL DETERMINATION OF A PORTION OF THE HUMAN VESTIBULAR SYSTEM RESPONSE THROUGH MEASUREMENT OF EYEBALL COUNTERROLL.

R. A. Hannen, M. Kabrisky, C. R. Replogle, V. L. Hartzler, and P. A. Roccaforte (AF Inst. of Technol., Wright-Patterson AFB, Dayton, Ohio).

IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Apr. 1966, p. 65-70. 14 refs.

6570th Aerospace Med. Res. Labs. supported research.

This work was undertaken to obtain a description of the otolith organs of the human vestibular system. The vestibular system is fairly inaccessible; thus, measurement by direct observation is difficult. Previous research has shown that eyeball counterroll is one external manifestation of the vestibular system response. In this work, therefore, an indirect measurement of the human vestibular system response was obtained through the measurement of eyeball counterroll. Human subjects were rotated about an axis through their line of sight at angular velocities varying from 0-20 r./min. The right eye was photographed and the angle of eyeball counterroll was determined by an optical correlation process. A mathematical expression for input-output characteristics for rotation inputs was formulated using Fourier curve fitting techniques. This description indicates that subjects with normal vestibular function demonstrate an eyeball counterroll which is a function of angular velocity and position with respect to the vertical. Subjects with known vestibular defects demonstrate a small counterroll.

A66-81745

STUDIES ON PULSE REACTION TO WELL DEFINED INDUSTRIAL NOISE: ECONOMIC PLANNING OF EXPERIMENTS WITH THE AID OF SEQUENTIAL ANALYSIS. PART I. [STUDIEN UBER DAS PULSVERHALTEN NACH DEFINIERTEM INDUSTRIELARM: OKONOMISCHES VERSUCHSPLANEN MIT HILFE DER SEQUENZANALYSE. I. MITTELLUNG].

Anneliese Fuchs-Schmuck (Med. Akad. "Carl Gustav Carus", Inst. für Arbeitshygiene, Dresden, East Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 22, no. 1, 1966, p. 1-9. 28 refs. In German.

Groups of individuals differing in their acoustic sensitivity were exposed to tape-recorded industrial noises while the pulse rate was recorded simultaneously. By means of sequential analysis, it was statistically shown, and graphically demonstrated, in what way pulse rate is related to such factors as autonomic nervous reactions, sound intensity, and noise spectrum. The experimental method and statistical analysis are discussed.

A66-81746

MAXIMUM OXYGEN UPTAKE IN HEALTHY NONATHLETIC MALES.

R. A. Binkhorst (Catholic U., Dept. of Physiol., Nijmegen, The Netherlands), J. Pool (U. Hosp., Lab. of Clin. Physiol., Leiden, The Netherlands), P. van Leeuwen (Netherlands Inst. of Prevent. Med., Depts. of Occupational Med. and Statist., Leiden), and A. Bouhuys (John B. Pierce Found., New Haven, Conn.) *Internationale Zeitschrift für angewandte Physiologie*, vol. 22, no. 1, 1966, p. 10-18. 23 refs.

Maximum oxygen uptake ($\dot{V}O_2$ max.), maximum heart rate (MHR), blood lactic acid (LA), and pH were measured during bicycle ergometer exercise in 52 men, 22 to 60 years old, engaged in clerical and light manual work (prison personnel and prisoners in the Netherlands). $\dot{V}O_2$ max. decreased with age, but less than expected from previous studies in which the data on young subjects were probably biased in favor of well-trained individuals. The data provide provisional standard values for $\dot{V}O_2$ max. in healthy untrained males, derived from

a population in which physical activity was similar irrespective of age. MHR and LA decreased significantly with age after elimination of V_{O_2} as a variable. In 20 subjects, V_{O_2} max. was measured with the steady-state method and with a single increasing load test; the differences were small for practical purposes. The increasing load method is useful to estimate aerobic capacity in a single test, even in subjects unaccustomed to exercise tests.

A66-81747

LIMITS OF HUMAN PERFORMANCE AND ENERGY-PRODUCTION.

J. H. Ettema (Amsterdam U., Coronal Lab. voor Arbeidshyg., The Netherlands).

Internationale Zeitschrift für angewandte Physiologie, vol. 22, no. 1, 1966, p. 45-54. 14 refs.

Data of the registered best individual human performance (world records in swimming, running, skating, and cycling obtaining in 1965) are used to discuss the relation between some processes which play a part in human exertion. The relationship between maximal performance and mechanisms of energy production is presented in a schematic way. Two sources of energy production, aerobic and anaerobic metabolism, are discussed. In the past, many "laws" expressed as mathematical formulas were formulated about human performance and muscular exercise. It appears that several of the "laws" are linked with the same physiological mechanisms of energy reserve and reconstitution.

A66-81748

ON CIRCADIAN RHYTHMS OF SENSORIMOTOR PERFORMANCE [ÜBER EINE CIRCADIANE RHYTHMIK SENSORIMOTORISCHER LEISTUNGEN].

Gerd Jansen, Joseph Rutenfranz, and Roland Singer (Max Planck Inst. für Arbeitsphysiol., Dortmund, West Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 22, no. 1, 1966, p. 85-83. 34 refs. In German.

A survey of the literature dealing with the circadian rhythm of sensorimotor functions of men is given, and experiments of 24 hours are reported which were carried out with two trained male subjects during twelve days. At two hr. intervals the subjects had to perform a twofold task for ten minutes, consisting of a tracking task at the driving apparatus by Graf and simultaneous adding of two-digit numbers. The results of the experiments indicated that the tracking as well as the adding performance varied according to the time of day, the peaks and troughs of the performance of both tasks not coinciding temporarily. Combining the results of both tasks a circadian rhythm could be shown for the demanded twofold task in spite of intra- and interindividual variations. The statistical examination showed a zone of reduced performance in both tasks from 4 o'clock a.m. until 8 o'clock a.m., and a zone of increased performance for the adding task from 10 o'clock a.m. until 2 o'clock p.m. Also the qualitative changes in the tracking-task concerning the more or less flexible adaptation of "driving-speed" to the difficulties of the course of the curve, showed a dependency on the time of day. The findings are discussed in comparison with the results of other authors. It is noted that the circadian rhythm should be accounted for at the comparison of results of sensorimotor experiments as well as at practical sensorimotor activities.

A66-81749

CIRCULATION TIME AND BLOOD VOLUME IN ATHLETES AS RELATED TO OTHER CIRCULATION MEASUREMENTS [KREISLAUFZEITEN UND BLUTVOLUMEN VON SPORTLERN IN BEZIEHUNG ZU ANDEREN MESSGROSSEN DES KREISLAUFS].

W. Gerhardt, U. Wierig, J. Keul, and H. Reindell (Med. U. Klin., Freiburg i. Br., West Germany).

Archiv für Kreislaufforschung, vol. 49, Apr. 1966, p. 188-214. 135 refs. In German. Deutsche Forschungsgemeinschaft supported research.

Circulation time and the blood volume were measured in superior athletes (34 men, 1 woman) and the results were compared to the results of other simultaneous circulatory measurements (arterial and venous blood pressure, rising-tension-time and ejection time of the heart, physical circulatory analysis, cardiac volume, spiroergometry). In the athletes, an increase was noted in mean cardiac volume, circulatory and respiratory capacity, absolute and relative blood volume, and arm-lung-time. The upper limit of the normal rising-tension-time was overstepped by 17 athletes. The ejection time of the left ventricle was prolonged. The pulse wave velocity was normal. The diastolic wave in the femoral artery was prolonged. Stroke volume and cardiac output were within the range of the standard values (85 ml. and 4.61 l.), respectively. While the coefficient of the volume elasticity of the aorta was normal, the peripheral resistance was increased. Average arterial blood pressure was slightly above normal. The circulation times and the blood volumes are correlated with other circulatory measurements in 12 diagrams, and results are discussed by comparison with given results of other authors. The vagotonic signs of the cardiac and circulatory dynamics of the athletes is additionally proved with normal persons, whose beta-receptors were blocked with Propranolol. This caused a change of cardiac dynamics, which have a striking resemblance to the effects of training. The reduced tonus of the cardiac muscle of the athletic heart can be expressed in the quotient: stroke volume/filling time, which was increased over that of normal persons.

A66-81750

THE NORMAL BEHAVIOR OF FUNCTIONAL CIRCULATORY PARAMETERS DURING PHYSICAL EXERCISE. VII. THE RELATIONSHIP BETWEEN HEART MINUTE VOLUME AND FUNCTIONAL BODY SURFACE [DAS NORMALVERHALTEN DER FUNKTIONSGROSSEN DES KREISLAUFS UNTER KÖRPERLICHER ARBEIT. VII. MITTELLUNG: DIE ABHÄNGIGKEIT DES HERZMINUTENVOLUMENS VON DER FUNKTIONELLEN KÖRPEROBERFLÄCHE].

W. Noder (Münster U., Staatsbad Salzungen, Bäderwiss. Inst., West Germany).

Archiv für Kreislaufforschung, vol. 49, Apr. 1966, p. 284-294. In German.

The dependence of cardiac output (heart minute volume) from functional body surface was examined during exercise on 103 normal male subjects. It was demonstrated that the product of the proportionality factor (k_{lg}) and of functional body surface is absolutely constant, independently from age, weight, physical condition, and oxygen consumption. This means that, at equal conditions, the cardiac output is reversely proportional to the functional body surface.

A66-81751

THE EFFECTS OF A STRESS CONDITION AND OF VARIOUS DOSES OF INSULIN ON THE DEVELOPMENT OF AN ACUTE HYPERGLYCEMIC COMA SITUATION [DER EINFLUSS EINES STRESSZUSTANDES UND DER DOSISABHÄNGIGEN INSULINWIRKUNG FÜR DIE ENTSTEHUNG EINER AKUTEN HYPERGLYKÄMISCHEN KOMASITUATION].

K. Hecht, R. Baumann, T. Hecht, and H. Mitschke (Deut. Akad. der Wiss., Inst. für kortiko-viszerale Pathol. und Therapie, Berlin-Buch, East Germany).

Acta biomedica germanica, vol. 15, no. 4, 1965, p. 442-450. 13 refs. In German.

The blood-sugar level and general behavior under the effect of one, three, and five units/kg. insulin with continuous glucose supply and under varying environmental conditions (rest and stress) were investigated in rats over a 5-hour period in several series of experiments. During rest, the blood-sugar time curve showed the steepest slope ($\tan \alpha = 121$) with mere glucose supply, whereas application of five u./kg. insulin and glucose and of one u./kg. insulin and glucose caused $\tan \alpha = 53$ and $\tan \alpha = 64$, respectively. During stress, the flattest curve ($\tan \alpha = 16$) resulted with mere glucose administration. Under five u./kg., three u./kg. and one u./kg. insulin and glucose the slope was $\tan \alpha = 128$, 110, and 68, respectively. Under five u./kg. insulin and glucose during stress, the animals showed at four-five hours after injection and later, hyperglycemic coma conditions, and four animals died at a blood-sugar level exceeding 1000 mg./100 ml. These phenomena did not occur during rest. It is concluded that the course of the blood-sugar time curve and the response of the animals under simultaneous glucose and insulin supply are determined by the biologically different environmental conditions and the insulin dosage. The results obtained suggest that under stress condition with simultaneous exogenous glucose supply as additional stimulus, insulin acted overwhelmingly contrary to its blood-sugar-reducing effect, whereas during rest the normal dose-dependent hypoglycemicizing insulin effect may be observed. Whether this paradoxical insulin effect during stress results from parabolic phase conditions in the central nervous system remains to be clarified by further investigations.

A66-81752

EEG AMPLITUDE CHANGES DURING DIFFERENT COGNITIVE PROCESSES INVOLVING SIMILAR STIMULI AND RESPONSES.

Peter F. MacNeilage (McGill U., Allan Mem. Inst., Montreal, Canada).

Psychophysiology, vol. 2, Apr. 1966, p. 280-286. 9 refs. Contract DA-49-007-MD-626; Grants NIH M-1475, Can. DND 9425-04, NRC A.P. 29, and Dept. of NHW 604-5-69.

In order to investigate the effects on electroencephalographic (EEG) amplitude of cognitive processes, as distinct from direct effects of sensory stimulation and motor response, subjects were given three different tasks in which the stimuli were always similar sets of spoken numbers and the responses were always written numbers. In response to 61 regularly occurring, randomly ordered, single-digit numbers, seven subjects wrote, on successive trials, (1) the sum of every four consecutive numbers, (2) every fourth number, and (3) every "7" and "9" heard. Since the physical stimuli were the same and the movements of response were similar for the three tasks, intertask pattern differences in EEG alpha and beta amplitude would presumably be due to differences in the cognitive processes required in the tasks. No differences due to cognitive factors were found. All short-term variations in both alpha and beta appeared related to widespread effects of response and preparation for response. Pre-response effects seemed related to motor set which was distinguished from attentional factors. The results suggest the necessity for a greater emphasis on motor effects in EEG studies.

A66-81753

THE EFFECTS OF THREAT OF SHOCK ON HEART RATE FOR SUBJECTS WHO DIFFER IN MANIFEST ANXIETY AND FEAR OF SHOCK.

W. F. Hodges and C. D. Spielberger (Vanderbilt U., Dept. of Psychol., Nashville, Tenn.)

Psychophysiology, vol. 2, Apr. 1966, p. 287-294. 29 refs. Grants PHS MH 28,537 and HD 947.

Although there is growing consensus that psychophysiological response to stress is in part a function of the subject's definition of the situation, many investigators continue to ignore individual differences in subjects' interpretation of stressor situations. In this study, high (HA) and low (LA) anxiety subjects were run in Threat of Shock and No Threat Conditions. The Threat Condition produced a significant mean increase in heart rate (HR) as compared to the No Threat Condition, but there was no difference in the HR response of HA and LA subjects to threat of shock. However, subjects who reported moderate to extreme fear of shock two months prior to the experiment responded with greater HR acceleration than subjects who reported little or no fear. These findings were discussed in terms of a conceptualization of "anxiety" which distinguishes between anxiety as a transitory state of the organism and as a relatively permanent personality trait. It was concluded that subjects' "cognitive appraisal" of an experimental situation was an important determinant of psychophysiological responses to stress.

A66-81754

INDIVIDUAL THERMAL AND BEHAVIORAL FACTORS IN COLD-INDUCED VASODILATION

Warren H. Teichner (Mass. U., Inst. of Environ. Psychophysiol., Dept. of Psychol., Amherst).

Psychophysiology, vol. 2, Apr. 1966, p. 295-304. 18 refs. Grants AF-AFOSR 404 and PHS MH 04201.

Individuals were classified as fast and non-vasodilators during a first hand-cooling experience. They were then required to carry out a prolonged detection task in 80°F and in 55°F air temperature. Comparisons were made of bodily thermal characteristics during hand cooling and during the detection sessions and of the percentage and speed of detection. The results suggest the possibility of characteristic differences between the two classified groups as well as of a relationship between behavioral and thermal regulating mechanisms.

A66-81755

THE EFFECTS OF VERBALIZATION INSTRUCTIONS AND VISUAL ATTENTION ON HEART RATE AND SKIN CONDUCTANCE.

Joseph J. Campos and Harold J. Johnson (Cornell U., Ithaca, N. Y.)

Psychophysiology, vol. 2, Apr. 1966, p. 305-310. 12 refs. Grant PHS MH-10398.

This study investigated the effects of verbalization instructions and amount of visual attention on direction of change of heart rate (HR) and skin conductance (SC). Little evidence for directional fractionation of SC and HR was found with the conditions used. The variable of verbalization instructions produced a highly significant effect on HR and SC, and conditions of no-verbalization produced a consistent but non-significant decrement in HR. Other degrees of verbalization produced increments in HR. A visual attention variable produced no significant effect on either HR or SC, although means were arranged in order of increasing activation with increase in visual attention (stimulus complexity). Results were interpreted as being opposed to an intake-rejection hypothesis to account for directional fractionation of response and for HR decrements. Instead, the authors suggest that the requirement to verbalize can produce important changes in degree and direction of autonomic activation.

A66-81756

THIRTY-DAY STABILITY OF SPONTANEOUS GALVANIC SKIN RESPONSES IN MAN.

Richard F. Docter and Louis F. Friedman (Calif. U., Neuropsychiat. Inst., Los Angeles).
Psychophysiology, vol. 2, Apr. 1966, p. 311-315. 5 refs.
 Grant NIMH MH 08441-01.

Measures of long-range stability of spontaneous GSRs (Galvanic Skin Response) were obtained from 23 male university students. Records were taken throughout a weekly recording period and compared with measures obtained under identical conditions 30 days later. In addition to the investigation of long-term spontaneous GSR stability, this design permitted analysis of the 24-hr. stability of measured responses within each of the recording periods. Results yielded significant correlation between measures obtained 24 hr. apart, as well as a significant correlation between the median weekly rates of spontaneous GSR emission taken 30 days apart. Comparison of emission rates on comparable recording days 30 days apart failed to manifest a significant relationship. Present data support earlier studies of 24-hr. spontaneous GSR stability. In spite of the failure to find significant relationships between emission rates on comparable days of the two recording periods, the authors conclude that the significant relationship between median weekly rates of emission, taken 30 days apart, indicates that spontaneous GSR is an intra-individual characteristic which remains relatively stable, even over extended periods of time.

A66-81757

CHANGES IN ELECTROENCEPHALOGRAM AND OTHER PHYSIOLOGICAL MEASURES DURING SERIAL MENTAL PERFORMANCE.

Peter F. MacNeilage (McGill U., Allan Mem. Inst., Montreal, Canada).

Psychophysiology, vol. 2, Apr. 1966, p. 344-353. 24 refs.
 Contract DA-49-007-MD-626; Grants Can. DND M-1475, NRC A.P. 29, and Dept. of NHW 6-4-5-69.

This study attempted to answer two questions: (1) Can electroencephalogram (EEG) amplitude changes be related to specific moment-to-moment changes in task performance? (2) To what extent are EEG changes related to changes in other indices of activation? Physiological responses were recorded from 20 subjects during 12 alternately fast and slow trials of a paced auditory serial addition task and three writing trials involving similar responses. Trial-by-trial results showed that EEG amplitude usually tended to covary with other physiological functions in a manner expected from activation theory. All physiological levels decreased during the session but became increasingly sensitive to differences in task difficulty. Within trials there was some concordance between alpha amplitude levels and other physiological levels, but exceptions to this trend and further analysis of palmar conductance patterns suggested that consideration of differential sensitivities of the individual measures to behavioral events might be more profitable than an activation theory approach. The only relation between EEG changes and specific behavioral events was the tendency for alpha and beta to block during motor responses.

A66-81758

ALPHA AMPLITUDE AND AROUSAL: A REPLY TO SURWILLO.

R. G. Stennett (Board of Educ., London, Ontario, Canada).

Psychophysiology, vol. 2, Apr. 1966, p. 372-376. 5 refs.

Arguments are presented in answer to Surwillo's criticism (1965) of a statistical procedure used by Stennett (1957) to test the hypothesis of an inverted-U relationship between coronary alpha amplitude and palmar conductance. The rationale of the statistical technique involved is clarified. The

fallacy of the conclusions drawn by Surwillo's hypothetical data is illustrated. Certain methodological problems and pitfalls involved in studies of the arousal continuum are pointed out.

A66-81759

A REPLY TO SURWILLO ON ARTIFICIAL SKIN POTENTIAL BASAL LEVEL VARIATION AND SKIN POTENTIAL RESPONSE WAVE FORM.

R. C. Wilcott (Western Reserve U., Dept. of Psychol., Cleveland, Ohio).

Psychophysiology, vol. 2, Apr. 1966, p. 377-378.

In an investigation of skin potential basal level and skin potential response wave form, Surwillo (1965) found the latency of positive waves to be the same as uniphasic negative waves. It is suggested that Surwillo's inability to observe longer latency positive waves was due to a lack of elimination of skin potential activity at the reference electrode.

A66-81760

A RESTRAINT DEVICE FOR CATS IN AN ULTRAHIGH FREQUENCY ELECTROMAGNETIC ENERGY FIELD.

Allan H. Frey and Sarah Jane Thornton (Inst. for Res., State College, Pa.)

Psychophysiology, vol. 2, Apr. 1966, p. 381-383

ONR supported research.

A simple, inexpensive, well-tolerated restraint apparatus for cats is described which can be used for a variety of psychophysiological experiments. The restraint device consists of ropes tied snugly around the animals at neck, behind forelegs, and in front of hind legs. The ropes are attached to adjustable length dowels suspended from a bar parallel to the animal's spine. The device allows for maximum animal comfort since adjustments can be made for both height and length.

A66-81761

CIRCULATORY RESPONSES TO SIMULATED GRAVITATIONAL SHIFTS OF BLOOD IN MAN INDUCED BY EXPOSURE OF THE BODY BELOW THE ILIAC CRESTS TO SUB-ATMOSPHERIC PRESSURE.

Ellen Brown, J. S. Goei, A. D. M. Greenfield, and G. C. Plasaras (Calif. U., School of Med., Cardiovascular Res. Inst. and Dept. of Med., San Francisco).

Journal of Physiology, vol. 183, Apr. 1966, p. 607-627. 30 refs.

Grant PHS HE-06285.

Exposure of the body from iliac crests to feet of a horizontal subject to a pressure 70 mm. Hg below atmospheric causes a displacement of about 10 g. of blood/kg. total body weight from the upper to the lower part of the body. Much of this blood is returned very rapidly at the end of suction. During suction, the changes in the circulation resemble those during a foot-down tilt. After suction, the changes resemble to some extent those following the Valsalva maneuver. The overshoot of forearm blood flow following suction is caused by variations in the activity of adrenergic vasoconstrictor nerves. The receptors for this reflex have not been identified, but their stimulation depends upon a rapid and large return of blood to the central circulation.

A66-81762

THE INTERRELATION OF THERMOREGULATORY AND BARORECEPTOR REFLEXES IN THE CONTROL OF THE BLOOD VESSELS IN THE HUMAN FOREARM.

R. J. Crossley, A. D. M. Greenfield, G. C. Plassaras, and Dorothy Stephens (Calif. U., Med. Center, Cardiovascular Res. Inst., San Francisco).

Journal of Physiology, vol. 183, Apr. 1966, p. 628-636. 9 refs.

Grant PHS HE 06285.

The interrelation of thermoregulatory and baroreceptor reflexes in the control of the circulation through the forearm was investigated in eight men. The results are compatible with the current hypotheses that thermo-regulatory reflexes employ exclusively blood vessels in the skin, and that baroreceptor vasodilator reflexes excited by transfer of blood from the legs to the trunk employ exclusively blood vessels in the muscles. They are compatible with the hypothesis that baroreceptor vasoconstrictor reflexes excited by transfer of blood from the trunk to the legs employ blood vessels in muscles, but not with the hypothesis that they do so exclusively. The results indicate that when blood is transferred from the trunk to the legs, vasoconstriction over-rides thermoregulatory vasodilatation, presumably in the blood vessels of the skin. The circulation through the skin appears, therefore, to be under baroreceptor as well as thermoregulatory reflex control, and over the short period of time examined, namely one min., the baroreceptor control takes precedence.

A66-81763

EFFECT OF OXYGEN ON THE REGIONAL DISTRIBUTION OF VENTILATION AND PERFUSION IN THE LUNG.

H. S. Holley, A. Dawson, A. C. Bryan, J. Milic-Emili, and D. V. Bates (McGill U., Roy. Victoria Hosp., Joint Cardio-Respirat. Serv., Montreal, Canada).

Canadian Journal of Physiology and Pharmacology, vol. 44, Jan. 1966, p. 89-93. 7 refs.

John A. Hartford Found., Inc., USA and Med. Res. Council, Canada supported research.

Xenon¹³³ was used to measure distribution of ventilation and perfusion in the upper, middle, and lower lung zones of 12 upright healthy male subjects, at rest and during exercise, while breathing room air and after breathing 100% oxygen for 20 minutes. During the breathing of both air and 100% oxygen, ventilation and perfusion increased from the apex to the base of the lung, the differences between upper and lower zones becoming less pronounced during exercise. Oxygen breathing did not appear to affect distribution of regional ventilation or perfusion in normal upright man, either at rest or during exercise. This negative result is of importance in relation to the possible role in intact man of homeostatic mechanisms of adjusting perfusion and ventilation, which are sensitive to oxygen tension.

A66-81764

THE TEMPERATURE RESPONSE OF ACCLIMATIZED AND UNACCLIMATIZED RATS TO EXERCISE IN THE COLD.

G. E. Thompson and J. A. F. Stevenson (Western Ontario U., Dept. of Physiol., London, Ontario, Canada).

Canadian Journal of Physiology and Pharmacology, vol. 44, Jan. 1966, p. 139-146. 10 refs.

Med. Res. Council and Defence Res. Board, Canada.

Colonic and tail-skin temperatures of cold-acclimatized (4°C for four weeks) and unacclimatized (4°C for one day) rats were measured while they were being exercised on a treadmill (4.6 m./minute) in the cold (4°C). In unacclimatized animals the colonic temperature increased to the same level as when they were previously exercised at 24°C., but the

changes in tail-skin temperature indicated only a small vasodilatation. In cold-acclimatized animals the colonic temperature increased to a significantly higher level than in unacclimatized animals before peripheral vasodilatation appeared, and this higher colonic temperature was maintained as exercise continued. In addition, the cold-acclimatized animals showed a higher tail-skin temperature during rest and a greater vasodilatation during exercise than the unacclimatized controls. Rats treated for 6 days at room temperature (24°C.), with a mixture of thyroxine (25 µg./100 g. body weight per day) and cortisone (one mg. per rat per day) were exercised at 4°C. after being exposed to this temperature for only one day. The colonic temperature was controlled at a higher level in these animals than in saline-injected controls but peripheral vasodilatation was not greater.

A66-81765

CHANGES IN SENSORY PHENOMENA AND OBSERVER CRITERIA AT LOW RATES OF INTERMITTENT PHOTIC STIMULATION.

Carl W. Schneider and S. Howard Bartley (Mich. State U., Dept. of Psychol., East Lansing).

Journal of Psychology, vol. 63, May 1966, p. 53-66. 31 refs. Grants PHS 5 F1-MH-17,006-02 and NB 05260-02.

The present paper points out the fact that as the rate of intermittent photic stimulation is reduced from critical flicker fusion (CFF) to the point at which each member of the train of pulses is greatly enough separated from the others temporally to function as an isolated single pulse, the target changes its appearance in a marked way. This whole span can be divided into several ranges. All frequencies above, let us say, approximately 8 or 10 pulses per second, produce fields which possess either a perfectly steady brightness or a steady brightness component predominant enough to enable comparison in brightness with a field produced by a continuous, uniform photic input. But, as frequencies drop below the range just mentioned, various changes occur in what is seen. These changes disenable the kind of direct comparison just indicated. From this point on, as frequency is reduced, the observer uses either the bright phase of the cycle or attempts to "average" the values of the two phases, in attempting to find some brightness in the intermittent field to match to the steady field. This "averaging" is not a direct sensory observation but a kind of judgment, and thus at low frequencies a vacillation between two operations occurs.

A66-81766

SPECTROGRAPHIC ANALYSIS OF ELECTROENCEPHALOGRAMS UNDER CONDITIONS OF ALERTNESS AND RELAXATION.

J. A. Gengerelli and Christopher E. Parker (Calif. U., Dept. of Psychol., Los Angeles).

Journal of Psychology, vol. 63, May 1966, p. 67-72. 7 refs. Calif. U. supported research.

Analyses of human electroencephalograms (EEGs) were made with a spectrum analyzer under conditions of perceptual alertness and of relaxation. The range of frequency components studied was from zero to 30 c.p.s. Comparison of the spectrograms obtained under the two conditions showed a marked diminution in the amplitude of frequency components below 15 c.p.s., but no increases anywhere in the spectrum. In some subjects there was diminution in amplitude in the high frequency components also, but this change was quite small.

A66-81767**VISUAL SIGNAL DETECTION, AS A FUNCTION OF AGE, INPUT RATE, AND SIGNAL FREQUENCY.**

George A. Talland (Harvard U. Med. School, Mass. Gen. Hosp., Dept. of Psychiat., Boston, Mass.)

Journal of Psychology, vol. 63, May 1966, p. 105-115. 13 refs.

Grants NIH HD 00340 and HD 15.418.

Men aged between 20 and 60 years were tested for accuracy in signal detection in a visual search task over periods of 30, 36 or 48 minutes. Subjects had to press a key whenever the digit four appeared in a display that changed continuously and showed randomly varied patterns of nine or fewer digits. Displays remained in view for one of three intervals and changed irregularly at one of three mean rates. One-fifth of the displays contained the digit four. At the mean rates of 54 or 27 displays per minute performance did not change progressively with age up to 60 years. At a mean rate of 109 displays per minute errors of omission increased stepwise with each successive decade between the 20's and the 60's. Errors by incorrect response did not show a systematic trend with age. The aging effect observed is attributed to a slowing down of scanning and decision process which match the incoming message with a model. Performance tended to improve from the initial to the final phase, but this effect did not hold up with age. Increased signal frequency as well as a higher rate of event change reduced accuracy at all ages. Performance at the fast rate exerted a favorable delayed effect on signal detection at a slower rate with the younger and middle aged subjects; performance at the slowest rate showed an adverse delayed effect. These observations are considered in relation to expectancy and arousal theories of vigilance.

A66-81768**CENTRIFUGE FOR CHRONIC ACCELERATION STUDIES OF SMALL ANIMALS.**

Julian P. Cooke and Richard W. Bancroft (Aerospace Med. Div., USAF School of Aerospace Med., Physiol. Branch, Brooks AFB, Tex.)

Texas Journal of Science, vol. 18, Jun. 22, 1966, p. 151-156. 15 refs.

A description is given of the construction and operation of a small animal centrifuge which was devised especially for carrying out long-term, uninterrupted exposures to increased gravity fields. A nomogram is presented for ascertaining the effective gravity forces (g_E) in such a centrifuge in which suspended animal cages are allowed to align with vectorial forces.

A66-81769**ASSESSMENT OF ORTHOSTATIC TOLERANCE [ZUR BEURTEILUNG DER ORTHOSTATISCHEN TOLERANZ].**

K. Burkhart and H. W. Kirchhoff (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).

Wehrmedizin, vol. 4, May 1966, p. 89-99. 9 refs. In German.

Inferences can be drawn as to the stability of the circulation in an experimental subject by observing the values of such circulatory factors as pulse rate (f), systolic and diastolic blood pressure (RR_2 and RR_d) in the horizontal and in the standing positions, respectively. The rise in diastolic pressure in erect posture is due to the hemostatics of the blood vessels. The height of the hemostatic pressure was determined; its mean value for 500 subjects was 10 cm. Another possibility of determining the relative stroke volume, by comparing the lying with the upright position, is based on the equivalent bodily performance in each position. A practical numerical index (OJ) is suggested which would indicate the degree of orthostatic stability or liability according to the numerical value.

Similar to the performance index, a higher number indicates the more unfavorable circulatory conditions. The mean index, for 50 subjects was 12.4 ± 5.1 . The final part of the study consisted in establishing correlations of the O-indices with body weight, height, and age. In not a single case was there any significant correlation. This signifies that there is a general distribution of orthostatic stability or liability which is not related to weight and age.

A66-81770**ON THE RELATIONSHIPS BETWEEN MINOR TREMOR AND BALLISTOCARDIOGRAM IN MAN.**

Toshiyuki Ozaki, Minoru Yamamoto, and Katsuzo Fujiwara (Hiroaki U., Fac. of Med., Dept. of First Physiol., Hiroaki, Japan).

Acta Medica Nagasakiensia, vol. 9, Mar. 1965, p. 120-134. 20 refs.

The minor tremor (MT), or microvibration, of the thenar muscles was recorded in five normal adults under various physiological conditions. In addition to MT, the ballistocardiogram (BCG), electrocardiogram (ECG) and respiratory movements were also traced simultaneously to determine the correspondence between MT and the pulsation of the heart. In the relaxed awake state, the dominant vibrations of MT corresponded very well to I, J, and K, and L, M, and N waves of BCG as well as R and T waves of ECG. These changes corresponding to BCG or ECG were potentiated and weakened by deepening and stopping breathing, respectively. Both MT and BCG caused a marked increase in amplitude and frequency in cases of the Master two-step test as the load of ECG, in which facilitatory changes of circulatory and respiratory systems can be provoked. From the above-mentioned results, it seems likely that the facilitatory and inhibitory changes in the pulsation of the heart besides those in muscle tonus play an important role in the augmentation and inhibition in MT under various physiological conditions, and furthermore the respiratory changes in MT might be caused by respiratory changes of cardiac output in inspiratory and expiratory phases of respiration as well.

A66-81771**CONTRIBUTIONS TO THE STUDY OF IONIZED AIR AS AN ENVIRONMENTAL FACTOR AND ITS EFFECT ON THE ORGANISM [BEITRÄGE ZUM STUDIUM DER LUFTIONISATION ALS UMWELTFAKTOR UND IHRER WIRKUNG AUF DEN ORGANISMUS].**

M. C. DeLeanu (Med.-Pharm. Inst. and Inst. für Hyg., Cluj, Rumania).

Zeitschrift für die gesamte Hygiene, vol. 12, no. 5, 1966, p. 343-348. 15 refs. In German.

The results of studies on ionization of air and on biological effects of moderate small-ion concentrations are described. Determinations made in Cluj during the period from 1955 until 1964 clearly show that the density of small ions has risen since 1957, because of the atomic tests in the atmosphere. The small-ion concentration of the communal atmosphere has considerably increased due to the replacement of other fuels by natural gas. The small-ion density in rooms was determined and evaluated, depending on their use by persons, as well as on the kind of ventilation applied. Moderate densities of small ions induce an increase of alkaline phosphatase and glycogen in some organs of the chicken embryo. If stronger ionic concentrations are present, the amount of these substances markedly decreases. By feeding cholesterol to rabbits a reduction in spontaneous motility was induced. Atmospheric ion therapy compensated for this effect. The mechanism of the biological effect of atmospheric ions is discussed.

A66-81772**COMMUNICATING THROUGH THE SKIN.**

Stephen Kidd.

New Scientist, vol. 30, Apr. 14, 1966, p. 82-84.

The author outlines various programs for expanding the basic knowledge of cutaneous communication, and describes several systems proposed by investigators, in which vibrations could be utilized for producing tactile impression. The source may be mechanical or electric, or combined. Vocal vibrations are poorly received by the skin. Normal man under normal circumstances received adequate information through visual and auditory senses. Astronauts could find cutaneous communication useful as a supplementary source of information when their auditory and visual senses are overloaded, or when ambient noise or lack of adequate illumination limits vision and hearing.

A66-81773**CORTICAL AND SUBCORTICAL REACTION POTENTIALS AFTER SENSORY STIMULATION IN AWAKE AND SLEEPING CATS [CORTICALE UND SUBCORTICALE REAKTIONSPOTENTIALE NACH SENSORISCHER REIZUNG BEI DER WACHEN UND SCHLAFENDEN KATZE].**

A. Herz, I. Niedner, F. Fraling, and J. Sommer-Smith (Deutsche Forschungsanstalt für Psychiatrie, Abt. für Exptl. Neurophysiol., Munich, West Germany).

Experimental Brain Research, vol. 1, Apr. 26, 1966, p. 249-264. 39 refs. In German.

Evoked responses to acoustic stimulation and, in a few experiments, to light flash stimulation were obtained in cats with chronically implanted electrodes during different stages of sleep and wakefulness (acoustic stimulus 800 c.p.s. duration 0.3 sec., 85 dB, presented every 10 sec.). Recordings were made from auditory cortex, optical cortex, hippocampus (HC) and medial thalamus region (TM). Responses in the waking animal were smaller than those obtained during spindle activity or during high-voltage, slow wave sleep (HVS-sleep). Evoked potentials in the waking state resembled responses obtained during so-called paradoxical or low-voltage, fast wave sleep (LVF-sleep). Changes in the state of sleep or wakefulness altered the potentials recorded from unspecific cortex, HC, and TM more than those obtained from the specific sensory cortical area. Evoked potentials observed during LVF-sleep were similar to those seen while the cat was confronted with a rat, but were different from those recorded during excitation following administration of amphetamine, particularly in HC. The increased amplitude of the evoked potential in unspecific structures during HVS-sleep was due to augmentation of both the initial negative and the following positive wave of the response, the positive wave (latency 60-150 msec.) often being very pronounced. Increase of stimulus frequency to only 0.5-1/sec. during spindle activity led to changes resembling the waking state, although unaccompanied by behavioral arousal. Stimulation during spindle bursts evoked negative wave trains having the frequency of the spindles. These results are discussed with particular emphasis on the place of LVF-sleep in the wake-sleep-cycle and the possible relation of observed variations of the evoked potentials to synaptic processes.

A66-81774**AN UNUSUAL COURSE OF AN ACUTE CARBON TETRACHLORIDE POISONING [NEOBVYKLY PRIEBEH AKUTNEJ INTOXIKACIE TETRACHLORMETANOM].**

L. Božík and J. Droppa.

Bratislavské Lekárske Listy, vol. 46, Apr. 7, 1966, p. 439-442. In Slovak.

The clinical course of an acute accidental carbon tetrachloride poisoning is described. The poisoning was caused by inhalation of the agent while the subject was attempting to put out a fire, using a fire-extinguisher containing carbon tetrachloride. The poisoning was not detected until attention was aroused by an epileptic seizure setting in on the 12th day after the inhalation, in the period of hepatorenal syndrome (the second stage of poisoning). The epileptic paroxysm and other manifestations on the part of the central nervous system, as well as changes in electroencephalogram (EEG) tracings, are usually interpreted as being the result of a general metabolic disorder forming part of the hepatorenal syndrome. The fact that the EEG changes disappeared while the hepatorenal syndrome persisted leads to the presumption that the changes produced were more due to the indirect effect of carbon tetrachloride itself, being a result of supposed small foci of hemorrhage in the brain. Attention is drawn to the importance of correct instruction of the personnel coming into contact, though sporadically, with the agent or wherever its use is considered.

A66-81775**EFFECT OF MEAN AND ABSOLUTELY LETHAL DOSES OF IONIZING RADIATION ON PORPHYRINURIA OF EXPERIMENTAL ANIMALS. II. PORPHYRINURIA IN WHITE RATS FOLLOWING A SINGLE WHOLE-BODY X-IRRADIATION WITH 1100 r [VPLYV STREDNEJ A ABSOLUTNEJ LETALNEJ DAVKY IONIZUJUCEHO ZIARENIA NA PORFYRINURIU POKUSNYCH ZVIERAT. II. PORFYRINURIA BIELYCH POTKANOV PO JEDNORAZOVOM CELOTELOVOM OZIARENÍ RTG LUCMI DAVKOU 1100 r].**

D. Kolesár.

Bratislavské Lekárske Listy, vol. 46, Apr. 8, 1966, p. 465-471. 39 refs. In Slovak.

White rat littermates were irradiated with an absolutely lethal dose of 11 r of X-rays; it was found that in the first days after irradiation there was a moderate rise in porphyrinuria. The rise was statistically significant as compared to values prior to irradiation. The main derangements in post-irradiation porphyrinuria following the application of an absolutely lethal dose were ascertained in the quality of porphyrins excreted: there appeared porphyrins containing higher numbers of carboxyl groups including uroporphyrins. This is accounted for by a profound interference of a high dose of ionizing radiation with porphyrin biosynthesis.

A66-81776**EFFECT OF STATIC AND DYNAMIC LOAD ON SOME PHYSIOLOGICAL FUNCTIONS IN THE ORGANISM. I. CHANGES OF THE RESPIRATORY FUNCTIONS [VPLYV STATICKEHO A DYNAMICKEHO ZATAZENIA NA NIEKTORE FYZIOLOGICKE FUNKCIE ORGANIZMU I. CAST. ZMENY DYCHACICH FUNKCII].**

Imrich Borský, Miloslav Kubač, and Frantisek Strelka.

Pracovní lékařství, vol. 17, Oct. 1965, p. 345-350. 19 refs. In Slovak.

Changes of the respiratory functions, especially the metabolism of respiratory gases, were investigated in 16 healthy men of 20-24 years of age, during five minutes of model work and 13 minutes of recovery. Eight kinds of graded exercises were chosen. From these three kinds were carried out by holding various burdens in the upper extremities, in three positions: 40 and 75 cm. over the ground and at the height of the shoulders, with the upper extremities bent. Further, three kinds of exercises were represented by lifting and posing of the same burdens in three various heights. Two kinds of exercises were carried out by bending the trunk forward in various

rhythms (A—a slight, B—a deep forward bend). In total, the experimental persons were loaded by a variation of 32 exercises with a different quantity of static work components. The results obtained were used in order to prove the reliability of Atzler and Simonson's method for evaluation of static load and exertion. The imperfections of Atzler's method (determination of the percent ratio of the caloric consumption spent for the static work component) were pointed out; further the application of Simonson's restitution constant (RK') for the evaluation of the static exertion was critically discussed. It was stated that by these values the relative changes of the static load are expressed.

A66-81777

ROLE IN THE RAT OF TWO THALAMIC NUCLEI IN INSTRUMENTAL CONDITIONING [ROLE CHEZ LE RAT DE DEUX NOYAUX THALAMIQUES DANS LE CONDITIONNEMENT INSTRUMENTAL].

J. Delacour, D. Albe-Fessard, and S. Libouban (Fac. des Sci., Centres Nerveux, Lab. de Physiol., Paris, France). *Neuropsychologia*, vol. 4, May 1966, p. 101-112. 27 refs. In French.

In rats, lesions of the centromedian-parafascicular complex of the thalamus caused a marked, irreversible change in the learning and retention of a defensive conditioning task. The effect was negligible on the learning and retention of a simple alimentary conditioning task; on a complex alimentary conditioning task it was marked, but transitory. Lesions of the ventral posterolateral nucleus (VPL) had no effect on any of these tasks. Several hypotheses concerning the role of the centromedian-parafascicular complex in defensive conditioning are discussed, in particular its possible role in the emotional reactions to painful stimuli.

A66-81778

TELEVISION AND HEALTH [TELEWIZJA A ZDROWIE]. Wladyslaw Stein, Henryk Wieliczanski, Bogumil Kozlowski, Kazimierz Sobotkowski, and Czeslaw Rzakowski. *Wiadomosci Lekarskie*, vol. 19, Jan. 1, 1966, p. 13-18. 9 refs. In Polish.

The authors discuss the problem of dangers associated with working of many hours in the neighborhood of a fluorizing cinescope and the problem of harmful effects of watching the television set may cause progressive states of exhaustion with headaches. Therefore it is indicated to provide them with three-weeks leaves every six months. The frequency of lens changes in workmen working in the vicinity of cinescopes is called to attention. It is necessary to introduce a more strict control of safety rules during work at the cinescopes exposed to the danger of implosion. The television screen as a source of X-rays is completely safe for people watching television. In susceptible subjects watching the television from a near distance or askew may cause attacks of television epilepsy encountered more frequently in children than in adults. Long watching of television may cause migrainous attacks, intensification of involuntary movements in chorea, nocturnal enuresis, and pavor nocturnus.

A66-81779

THE RHYTHM OF SHIVERING: I. GENERAL SENSORY CONTRIBUTIONS; II. PASSIVE PROPRIOCEPTIVE CONTRIBUTIONS; III. CENTRAL CONTRIBUTIONS.

Douglas Stuart, Kenneth Ott, Koichi Ishikawa, and Earl Eldred (Calif. U., Depts. of Physiol. and Anat., Los Angeles). *American Journal of Physical Medicine*, vol. 45, Apr. 1966, p. 61-104. 52 refs.

Grants NIH NB-01143 and NB-05199.

Neural and mechanical contributions to the rhythmicity of shivering were studied in the cat and human. A variety of experimental approaches were employed and the results presented in three closely related papers. The importance of general sensory inflow was shown by deterioration in rhythmicity following deafferentation procedures. However, some residual rhythmicity of the hind limbs was detectable with unilateral or bilateral lumbo-sacral deafferentation and was even evident in peripheral nerve or ventral root activity of totally paralyzed and cooled animals. Experiments in which preferential deafferentation of muscle or skin was made in cats revealed that proprioceptive inflow was particularly important in maintenance of the shivering tremor. Further influence of the proprioceptors was seen in the effects of loading on the shivering of limbs and isolated muscles. The presence of a rhythmic central influence descending from supraspinal levels to drive shivering at all levels was considered unlikely in view of variations in tremor rates in different parts of the body. Similar considerations implied that the stretch reflex loop could not be the primary determinant of tremor periodicity. Yet changes in rhythm rate induced locally by loading, and evidence of fusimotor contributions obtained from the effects of reinforcement maneuvers and procaine block of fusimotor axons in muscle nerves, showed that proprioceptors influence threshold and rate of shivering. Tonic fusimotor innervation was not essential since shivering persisted in cats at levels of barbiturate anesthesia sufficient to fully suppress fusimotor activity. It was concluded that under experimental conditions, the contributions to the shivering tremor of general sensory inflow, proprioceptive input, mechanical factors and central influences could be recognized and each even shown to be essential. In the intact animal and human the rhythmicity of shivering would appear to involve a complex yet smooth interaction between all these contributions.

A66-81780

RECALL OF SIMULTANEOUSLY AND SUCCESSIVELY PRESENTED INFORMATION.

Peter L. Derks and Laidler Freeman (William and Mary Coll., Williamsburg, Va.)

Psychonomic Science, vol. 5, May 15, 1966, p. 51-52. Grant PHS MH 08889-01.

In order to examine the reported similarity in error distribution for recall of successively and simultaneously presented material, the two conditions were compared under total and partial report procedures. However, in this study, omission errors were predominantly at the front of the list for successive presentation and to the right for simultaneous presentation with both report procedures. Further investigation of successive presentation total report showed mislocation errors shifted toward the rear of the list relative to omission errors. These results lend some support to descriptions of memory which include a "reception" stage and an "organization" stage. The similarity in error distributions for successive and simultaneous presentations results in part from similar organizational strategies.

A66-81781

DICHOPIC SUMMATION OF INFORMATION IN THE RECOGNITION OF BRIEFLY PRESENTED FORMS.

William A. Carlson (Veterans Admin. Hosp., Danville, Ill.) and Charles W. Eriksen (Ill. U., Urbana).

Psychonomic Science, vol. 5, May 15, 1966, p. 67-68. 6 refs.

Visual form identification was studied under conditions where the forms to be identified were presented briefly to the right and left eyes alone, to the right and left eye simultaneously on corresponding areas, and to the right and left eye

sequentially on corresponding areas. The results suggest the following conclusions: (1) successive stimulation of the two eyes is better than either eye alone if the stimulation falls on corresponding areas; (2) successive stimulation of corresponding areas is about identical to simultaneously stimulated corresponding areas; and (3) the amount of gain in identification accuracy resulting from stimulation to the two eyes is not greater than can be attributed to two independent opportunities to perceive.

A66-81782

AN EVENT SELECTOR FOR SEQUENTIAL CONTROL.
Harold T. Salive (Mich. U., Ann Arbor) and David E. Carter (Columbia U., New York, N. Y.)

Psychonomic Science, vol. 5, May 15, 1966, p. 71.
Contract AF 49(638)-367.

A circuit using a stepping switch coupled to a number of rotary selector switches is suggested as a general solution to the problem of programming sequential events automatically. A number of applications are discussed including the programming of visual and auditory stimuli and the recording of responses under several different conditions.

A66-81783

EVIDENCE OF SEMANTIC CODING IN SHORT-TERM MEMORY.

H. C. A. Dale and M. Gregory (Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Psychonomic Science, vol. 5, May 15, 1966, p. 75-76. 6 refs.

An effect of semantic similarity in short-term memory was demonstrated and was compared with the effect of acoustic similarity. In free recall, using the retroactive interference (RI) paradigm, semantic similarity between OL and IL increased intrusions from IL, but decreased omissions. By contrast, acoustic similarity caused both IL intrusions and omissions to increase.

A66-81784

HEALING OF LIVER WOUNDS AFTER EXPOSURE TO LARGE DOSES OF IONIZING RADIATION [ZAZHIVLENIE RAN PECHENI V USLOVIYAKH DEISTVIA BOL'SHIKH DOZ IONIZIRUIUSHCHEI RADIATSII].

P. E. Ogii (Ternopol Med. Inst., Dept. of Pathol. Anat. and Dept. of Fac. Surg., UkrSSR).

Klinicheskaya Khirurgiya, vol. 6, Jun. 1965, p. 28-32. 17 refs. In Russian.

Rabbits were exposed to ionizing radiation of 1090 rad, followed by an aseptic incision into the liver which was immediately stitched. During recovery, there was a lag in tissue reparation, particularly in the development of connective tissue. The retardation depended on the phase of radiation sickness and the time of damage infliction on the organ. If the incision was made during the latent period of radiation sickness, a belt of new granular tissue appeared around the area of necrosis. With the progress of radiation sickness the formation of mature cells of the outside layer took place with simultaneous suppression of new tissue. Animals which underwent section during later stages of radiation sickness showed a much slower regeneration rate. At the end of radiation sickness, new tissue had infiltrated the necrotic layer.

A66-81785

ABSOLUTE JUDGMENT OF DISTANCE AS A FUNCTION OF INDUCED MUSCLE TENSION, EXPOSURE TIME, AND FEEDBACK.

N. McK. Agnew, Sandra Pyke, and Z. W. Pylyshyn (Saskatchewan U., Canada).

Journal of Experimental Psychology, vol. 71, May 1966, p. 649-654. 17 refs.

Grant NIMH MY-3612 and Can. Natl. Res. Council supported research.

With knowledge of results as a between-group variable, and with two levels of induced muscle tension and two levels of exposure time as within-group variables, 36 subjects were tested for accuracy and response bias in an absolute judgment of distance task. Both knowledge of results and long exposure time significantly facilitated accuracy of judgments and reduced response bias. Induced muscle tension significantly facilitated accuracy of judgments, and interacted with knowledge of results yielding greatest facilitation under the no-feedback condition.

A66-81786

VIBROTACTILE ADAPTATION AND RECOVERY MEASURED BY TWO METHODS.

J. F. Hahn (Va. U. Charlottesville).

Journal of Experimental Psychology, vol. 71, May 1966, p. 655-658. 11 refs.

Grant PHS NB-04177.

Tactile adaptation to sinusoidal vibration of two hundred- μ peak-to-peak amplitude on the index fingerpad was measured by absolute threshold and matching methods. The temporal course of adaptation was the same in both cases, with adaptation still progressing after twenty-five min., but threshold change was always greater than the change in subjective magnitude by a factor of 2.8. Recovery from adaptation was somewhat more rapid for subjective magnitude than it was for absolute threshold. The concept of "stimulus failure" as originally formulated does not account for the data, but some modification of it may do so.

A66-81787

SEQUENTIAL EFFECTS IN DISJUNCTIVE REACTION TIME: IMPLICATIONS FOR DECISION MODELS.

Judith A. Williams (McGill U., Montreal, Canada).

Journal of Experimental Psychology, vol. 71, May 1966, p. 665-672. 5 refs.

Grant DRB, Canada 9425-10.

Among the effects showing that decisions in serial disjunctive reaction time (DRT) tasks are dependent upon sequential structure of the signal series are latency differences between responses to repeated (Sa following Sa) and changed (Sb following Sa) signals. The present study examines sequence effects and their implications for decision models. Four DRT experiments were performed (total N=159). In Experiment I, each of eight groups showed a significant sequence effect in the direction of lower latencies for responses to changed than to repeated signals. Experiments II and III showed that this effect could not be attributed to either peripheral (retinal) fatigue or subjects guessing habits. In a fourth experiment, latencies were markedly lengthened when signal sequence and response sequence were varied independently. A trial-to-trial comparison process is proposed to account for the present results, and as a useful supplement to existing decision models.

A66-81788

INFORMATION VERSUS REWARD IN BINARY CHOICES.

Amos Tversky and Ward Edwards (Mich. U., Ann Arbor).

Journal of Experimental Psychology, vol. 71, May 1966, p. 680-683.

Grant AF-AFOSR 192-63.

This binary prediction experiment isolates the rewarding characteristics of outcomes from their informative characteristics. On each of one thousand trials subject had to choose between two acts. He could guess which of two lights was correct, whereupon a nickel was added to or subtracted from a sum to be paid to him after the experiment, but he received no immediate feedback. Or he could observe which light was correct with no financial consequences. All subjects deviated from optimal strategy by seeking far too much information. Nonstationary instructions hindered performance, hypothetical predictions improved it.

A66-81789**STARTING POSITION, ADAPTATION, AND VISUAL FRAMEWORK AS INFLUENCING THE PERCEPTION OF VERTICALITY.**

Ricardo B. Morant and Joel Aronoff (Brandeis U., Waltham, Mass.)

Journal of Experimental Psychology, vol. 71, May 1966, p. 684-686. 6 refs.

Grants PHS MH-13,721-04 and M-3658.

Using an electrically controlled rod and frame apparatus, sixteen subjects were exposed to various conditions of tilts of the rod alone, frame alone, and rod and frame together. Increased exposure time resulted in increased shifts in the position of apparent vertical in the rod alone and frame alone conditions but not in the rod and frame together conditions. Aftereffects measured on the rod alone, after viewing the rod and frame together, were found equivalent to those obtained after viewing the rod alone. This finding was supported in a 2nd experiment using longer exposure periods. Two different mechanisms must be postulated to explain these effects.

A66-81790**EFFECTS OF ASSOCIATION VALUE ON PERCEPTUAL SEARCH.**

Edward E. Smith and Howard Egeth (Mich. U., Ann Arbor). *Journal of Experimental Psychology*, vol. 71, May 1966, p. 687-690. 5 refs.

Contract AF 49(638)-1235.

The effect of association value (AV) on stimulus discriminability was investigated by using a search methodology which yields an estimate of the time required to process each item. Subjects were required to locate a target nonsense syllable embedded in a column of other nonsense syllables. Sixteen search lists were prepared so that there were four lists for each of the four possible combinations of high and low AV of target and field items. The results failed to support the hypothesis that AV affects discriminability as had been concluded in an earlier study and indicated that letter-searching strategies may account for the differences in results between the two studies.

A66-81791**INFLUENCE OF LUMINANCE ON A TWO-CHOICE DECISION TASK.**

James R. Nazzaro and João Claudio Todorov (Brasilia U., Brazil).

(*Congr. of Psychol., Miami, Dec. 1964*).

Journal of Experimental Psychology, vol. 71, May 1966, p. 696-699. 12 refs.

The influence of differing levels of luminance on probability of response was investigated. Sixty-three subjects were given 200 trials in a two-choice guessing task. The lights appeared according to a random schedule. Two groups

were used, one receiving reinforcement in the proportions 75:25 and the other 50:50. Within each group three different luminance conditions were used: right light brighter than left, right light dimmer than left, and both lights equal. Greater luminance with the more frequent light produced greater response frequency than when both lights were equal. Lower luminance with the more frequent light produced lower response frequency. When both lights appeared equally often, luminance had no effect on response frequency. The data were interpreted in terms of magnitude of reinforcement, and in the increased formation of response sets.

A66-81792**BEHAVIOR IN A CONTINUOUS-RESPONSE TASK WITH QUASI-DETERMINATE, NONCONTINGENT REINFORCEMENT.**

Seymour Rosenberg (Bell Telephone Labs., Inc., Murray Hill, N. J.)

Journal of Experimental Psychology, vol. 71, May 1966, p. 700-705. 7 refs.

The purpose of the study was twofold: (a) To determine whether the behavioral effects of "social awareness" can be demonstrated when these effects are not obscured by learning effects. The experimental situation was described to one-half the subjects as a standard learning task; the other one-half of the subjects were told, in addition, that reinforcement was determined by another subject's response. In both cases a noncontingent schedule was used. (To examine behavior in a quasi-determinate situation with a stochastic model previously developed for the determinate case. Sixty-four subjects were run for one-hundred-fifty-one trials. The two sets of instructions produced differences between groups in the distribution of responses. Of the two fundamental properties of the model, termed linearity and heteroscedasticity, only the heteroscedasticity property was found in the data.

A66-81793**INFORMATION ENCODING AND DECISION TIME AS VARIABLES IN HUMAN CHOICE BEHAVIOR.**

Louis M. Herman (Queens Coll., New York, N. Y.) and Harry P. Bahrick (Ohio Wesleyan U., Delaware).

Journal of Experimental Psychology, vol. 71, May 1966, p. 718-724. 10 refs.

Paired-comparison wagers were offered to subjects under two different methods of encoding decision-parameter information. Method 1 provided subject with a set of four elements of nonindependent parameter information. Method 2 with a subset comprised of two independent elements. Subjects' choices showed significantly closer correspondence to an expected value-maximization decision rule under Method 2, for both independent groups and repeated-measures designs. With repeated measures, given sufficient decision time, Method 2 transferred positively to Method 1, with the opposite true (negative transfer) when order of administration was reversed. It is concluded that the basic problem for subject in choice situations is the selection of decision rules rather than of decision alternatives. Decision rules may then by asymmetrically transferrable across different encoding methods.

A66-81794**SPATIAL ADAPTATION AND AFTEREFFECT WITH OPTICALLY TRANSFORMED VISION: EFFECTS OF ACTIVE AND PASSIVE RESPONDING AND THE RELATIONSHIP BETWEEN TEST AND EXPOSURE RESPONSES.**

G. Singer (Sydney U., Australia) and R. H. Day (Monash U., Victoria, Australia).

Journal of Experimental Psychology, vol. 71, May 1966, p. 725-731. 10 refs.

Adaption and aftereffect to prism-induced spatial transformation of vision was investigated in two experiments and a control series. In Experiment 1 kinesthetic-muscular responses without vision preceded and followed similar responses with prismatically transformed vision during exposure. In the four control experiments responses were made without transformed vision during exposure. Significant aftereffects occurred in Experiments I and II but in neither did they vary in magnitude as a function of either passive or active responses during exposure, relation of test to exposure responses, or to type of response made during the test phase. No significant effects occurred in the control experiments. The significantly smaller mean aftereffect for Experiment II suggested that aftereffects from spatially transformed vision are largely a function of the spatial relationships between test and exposure responses.

A66-81795

INFERENCE BEHAVIOR IN MULTIPLE-CUE TASKS INVOLVING BOTH LINEAR AND NONLINEAR RELATIONS.

David A. Summers and Kenneth R. Hammond (Colo. U., Boulder and Denver).

Journal of Experimental Psychology, vol. 71, May 1966, p. 751-757. 16 refs.

Grant NIMH M-4977.

Ninety subjects made predictions in two-cue tasks having the following characteristics: (a) one cue related in a linear manner, the other in a nonlinear manner to the criterion, (b) the criterion partly, but not perfectly, predictable from either cue alone, and (c) the criterion perfectly predictable from both cues. Subjects were studied under three conditions involving different proportions of linear and nonlinear task variance, and three levels of task information. Results indicate that task properties and task information determine both inferential accuracy and cue dependence.

A66-81796

ACQUISITION OF HIERARCHICAL CONTROL OVER THE TEMPORAL ORGANIZATION OF A SKILL.

Richard W. Pew (Mich. U., Ann Arbor).

Journal of Experimental Psychology, vol. 71, May 1966, p. 764-771. 6 refs.

Contracts AF 49(638)-449 and AF 49(638)-1235.

A two-state relay control system in which subject controls the position of a continually moving target with two response keys is employed to test the validity of concepts of hierarchical organization in skill development. As training progresses with this task subjects tend to develop strategies for improving their performance which imply control of the effect of an ongoing sequence of responses rather than execution of each response as a separate unit. Interresponse-time analysis reveals two distinctive modes of performance, designated the open-loop mode and the modulation mode, both of which imply higher level control of the timing of response sequences but that achieve this control in two different ways.

A66-81797

HUMAN HEART-RATE RESPONSES DURING EXPERIMENTALLY INDUCED ANXIETY: EFFECTS OF INSTRUCTIONS ON ACQUISITION.

George E. Deane (N. Y. State U., Binghamton).

Journal of Experimental Psychology, vol. 71, May 1966, p. 772-773.

Grant NIH MH-06590-02.

Base-level measurements of cardiac activity were made while 12 subjects watched the sequence of No. 1-12 appear on a memory drum. Each subject was then told that the would sometimes receive a shock during one of the numbers. Each subject received 10 shocks on No. 10 during the 15 shock-anticipation trials. An acceleration in rate during No. 1-8 appeared on the first trial and gradually decreased in amplitude over trials, whereas a deceleration in rate during No. 10 appeared only near the end of the trials.

A66-81798

SELECTION STRATEGIES IN CONCEPT ATTAINMENT AS A FUNCTION OF NUMBER OF RELEVANT PROBLEM ATTRIBUTES.

Patrick R. Laughlin (Northwestern U., Evanston and Chicago, Ill.)

Journal of Experimental Psychology, vol. 71, May 1966, p. 773-776. 6 refs.

Selection strategies were compared for two-attribute and four-attribute concept-attainment problems. Two types of stimulus displays were used: (a) form displays, consisting of geometric forms varying in six attributes with two levels of each, (b) sequence displays, consisting of six plus and/or minus signs in a row. Four-attribute concepts resulted in more use of the focusing strategy than two-attribute concepts, with no difference in the scanning strategy, and fewer untenable hypotheses. There was no difference between form and sequence stimulus displays.

A66-81799

FIGURAL AFTEREFFECT PRODUCED BY A PHENOMENAL DICOTOMY IN A UNIFORM CONTOUR.

Bernard Weitzman (Creedmoor Inst. for Psychobiol. Studies, Queens Village, N. Y.)

Journal of Experimental Psychology, vol. 71, May 1966, p. 781-783.

In a previous paper Weitzman (1963) reported a figural aftereffect which was explained as a consequence of a figure-ground dichotomy. A possible source of artifact, however, was subsequently discovered in the structure of the experimental stimuli. The present report describes a replication of the previously reported experiment. In this replication the stimuli are corrected to eliminate the artifactual possibility. The data from 14 of the 16 subjects supported the hypothesis. It is concluded that it is still possible to maintain that the position of a contour in a phenomenal dichotomy effects the magnitude of figural after-effect which that contour will produce.

A66-81800

LEADERSHIP IN SMALL GROUPS: A RESOLUTION OF DISCORDANCE.

Arnold Binder (N. Y. U., New York), Burton R. Wolin, and Stanley J. Terebinsk (Systems Develop. Corp., Santa Monica, Calif.)

Journal of Experimental Psychology, vol. 71, May 1966, p. 783-784.

NSF supported research.

One condition of a prior experiment by the present authors yielded fits far more discrepant from a theoretical model than other conditions. The deviant condition was 753 in which the numbers refer to the probabilities of each member of the

group with leader being reinforced. Repeating the condition with varied reinforcement schedules for different groups provided fits between obtained and predicted results comparable to those for other conditions. This condition does not present unique problems for the model.

A66-81801

COMPARATIVE STUDIES ON THE PROTECTION SHOWN BY ALPHA-AMINOTHIOACETAMIDE, CYSTEINE AND ANOXIA AGAINST THE ACTION OF GAMMA RAYS ON ALLIUM CEPA.

M. D. Elkhaila (Khartoum U., Dept. of Botany, Sudan).

Radiation Botany, vol. 6, 1966, p. 285-288. 10 refs.

Primary roots of *Allium cepa* were used to investigate and compare the protective effect of certain chemical substances as well as anoxia in pre-treatment against the action of gamma-rays. Survival of roots and chromosome damage were taken as measures of radiation effect. Anoxic condition was found to be superior in protection to that shown by cysteine or alpha-aminothioacetamide. Protective factors obtained through such pre-treatments were comparable to protective factors obtained in an earlier study where the rate of growth of *Allium cepa* roots was the measure of radiation effect.

A66-81802

EFFECT OF THE SUPERHIGH FREQUENCY ELECTROMAGNETIC RADIATION ON THE ORGANISM [O VLIANII ELEKTROMAGNITNYKH IZLUCHENI SVCH DIAPAZONA NA ORGANIZM].

I. R. Petrov and A. G. Subbota.

Voenna-meditsinskii Zhurnal, no. 2, Feb. 1966, p. 16-21. 9 refs. In Russian.

Results of animal experiments published by various researchers show two types of changes in the organisms exposed to the superhigh-frequency electromagnetic radiation: (1) adaptive reactions, and (2) pathological changes. The adaptive reactions are the response of the regulatory mechanisms of the physiological functions. The most important of these is the increase in temperature of the reflex apparatus. The central nervous system plays an important part in this mechanism. The mechanism of pathological changes is more complicated, and is not well studied. Some pathological changes, such as necrosis and cataracts, can be considered as a direct result of the radiation, that is the combined effect of high temperature and a specific reaction. In cases which show no increase in tissue temperature, the effect may be on the molecular level. Various reactions may be involved, but the general effect is that of primary neurosis with a resultant disruption of the relationship between the cortex and the subcortical areas.

A66-81803

BIOLOGICAL EFFECT OF HIGH TENSION OXYGEN ON THE ORGANISM OF MAN AND ANIMALS [O BIOLOGICHESKOM DEISTVII VYSOKIKH DAVLENII KISLORODA NA ORGANIZM CHELOVEKA I ZHIVOTNYKH].

A. I. Govorov and A. F. Panin.

Voenna-meditsinskii Zhurnal, no. 2, Feb. 1966, p. 26-30. 6 refs. In Russian.

Oxygen breathing at one atmosphere pressure is used in the decompression procedure to prevent bends in deep sea diving operations. It is also used in clinical practice. However, oxygen breathing may cause pathologic disturbances under certain conditions. Studies of metabolic processes during oxygen intoxication lead to conclusions that the effect may

be twofold: (1) accumulation in the blood of some incompletely oxidized products of metabolism due to lowering of the enzyme activity, and (2) a disturbance in the neurohumoral mechanisms which regulate the tissue metabolism. These changes may be caused by the shift of trophic regulation of vital organs and tissues by the nervous system, and by changes in their blood supply.

A66-81804

SUCCESSIVE REVERSALS INVOLVING TWO CUES.

N. S. Sutherland (Sussex U., Lab. of Exptl. Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 97-102. 9 refs.

NASA Grant NsG-496, Contract DA-36-039-AMC-03200(E), Grants NSF GP-2495 and NIH MH-04737-05.

Rats were trained on a visual discrimination problem with two relevant cues, brightness and orientation. They were then given eight reversals in succession on the same problem. After reversals 7 and 8 they were tested with each cue presented on its own to see how much they had learned about each. Individual animals tended to reverse the cue about which they learned more from reversals 7 to 8, so that animals which had learned reversal 7 mainly in terms of the brightness cue learned reversal 8 mainly in terms of the orientation cue and vice versa. The result provides further confirmation for a two-process model of discrimination learning in which one process is that of selective attention.

A66-81805

THE CAPACITY FOR GENERATING INFORMATION BY RANDOMIZATION.

A. D. Baddeley (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 119-129. 18 refs.

Response selection was studied independently of the stimulus by asking subjects to generate random sequences of letters or numbers. Experiment 1 varied rate of letter generation from one-half sec. to four sec. per item and showed that the redundancy of the sequence increased linearly with rate. Experiment 2 added random generation of letters as a secondary task to paced card sorting. Information load per card was varied from one through two to four to eight alternatives, with sorting rate held constant. As predicted, the redundancy of the sequences generated increased linearly with sorting load. Experiment 3 varied number of items to be randomized. Rate of random generation increased systematically from two to four to eight alternatives, but levelled out beyond this point, showing no difference between 16 and 26. In general, these results suggest a response-selection mechanism of limited informational capacity.

A66-81806

ON THE HANDLING OF HEAVY BIAS IN A SELF-PACED TASK.

J. A. Leonard, R. C. Newman, and A. Carpenter (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 130-141. 8 refs.

Following an earlier observation that systematic variations in performance on a task with heavy frequency imbalance was correlated with fluctuations in the amount of bias in the input program, an experiment was carried out to establish the roles of long and short term sampling. Two groups of subjects

were trained on a self-paced, five-choice task. One group's input had an average of 68% bias on one source, the other had 44% on the same source. Analysis of data was carried out on three levels of local bias for each condition, one level being identical for both conditions. Responses to the biased stimuli were determined by the average bias in each input sequence and not by moment-to-moment variations in that bias. The effect observed originally can therefore be accounted for in terms of a relatively simple additive model which includes the "repetition effect" first described by Bertelson (1961).

A66-81807

CENTRAL INTERMITTENCY TWENTY YEARS LATER.

Paul Bertelson (Brussels Free U., Lab. of Psychol., Belgium). *Quarterly Journal of Experimental Psychology*, vol. 18, May 1966, p. 153-163. 45 refs.

The intermittency hypothesis between a sensory data and responses in human sensorimotor activity, proposed by Craik (1945), subsequently opened the way to an analysis of complex activities into basic decision units, each consisting of the choice of the adequate reaction for a particular sample of sensory input. Several conditions under which intermittency is observed, and the qualitative and quantitative aspects of intermittency are considered.

A66-81808

VISUAL SEARCH WITH MEANINGFUL AND NON-MEANINGFUL MATERIAL.

Kenneth T. Strongman and Robert Brown (Exeter U., Dept. of Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 164-168. 7 refs.

Two experiments are reported which attempt to assess the effects of variations in target word, context items, and instructions on performance in a visual search task. In Experiment 1, subjects were required to search through context lists of three-letter nonsense syllables (of either high or low association value) for three-letter meaningful target words (of either high or low frequency). They were given either "positive" or "negative" instructions, i.e., were told either to pick out the meaningful word or to pick out the word which was not a nonsense syllable. Visual search times were significantly influenced by both frequency of target word and association value of context items. A significant interaction was observed between type of instructions and target word frequency. The design of Experiment 2 followed that of Experiment 1, with the exceptions that nonsense syllables now became target items, and meaningful words formed the contexts. Again, nonsense syllable association value and word frequency were critical in determining visual search times.

A66-81809

"ADAPTATION AND REPULSION IN THE FIGURAL AFTER-EFFECT" AND THE PSYCHOPHYSICAL THEORY.

M. M. Taylor (Defence Res. Med. Labs., Toronto, Canada).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 175-177. 9 refs.

Data recently presented by Wilson (1965) seem to demonstrate the separate effects of adaptation and of after-effect repulsion during and following continued observation of a curved line. Inasmuch as the experiment was performed without apparent reference to the psychophysical theory of figural after-effects, it is interesting to note that the results on adaptation agree qualitatively with one of the major presuppositions of the theory, and the results on repulsion agree quantitatively with its predictions.

A66-81810

COMMENTS ON DR. M. M. TAYLOR'S NOTE.

J. Wilson (Bristol U., Dept. of Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 178.

This is a discussion of the theoretical differences between the author and Taylor's psychophysical theory (1962) with respect to figural after-effect.

A66-81811

AGE DIFFERENCES IN THE RATE OF GAIN OF INFORMATION, SIGNAL DETECTION STRATEGY AND CARDIOVASCULAR STATUS AMONG PILOTS.

J. Szafran (Lovelace Found. for Med. Educ. and Res., Dept. of Exptl. Psychol., Albuquerque, N. Mex.).

Gerontologia, vol. 12, no. 1, 1966, p. 6-17. 23 refs.

A description is given of work in progress which aims to sketch an "aging profile" of capacities of professional pilots from the standpoint of cardiovascular and pulmonary physiology and of experimental psychology. The design of the psychological experiments is intended to reflect the fact that flying requires, inter alia, making high-speed decisions and detecting low probability and low intensity signals, as well as an ability to receive and retain significant amounts of information in the course of routine control procedures. Measures of "reserve channel capacity" and "threshold resistance" reveal that in a sample of some 200 active pilots, age differences are less impressive than would be expected from gerontological literature. The individual differences in some of the relevant modalities of performance are, however, related to cardiovascular status among perfectly healthy men. Some methodological implications of these data are briefly considered.

A66-81812

EFFECT OF EFFORT ON CALCIUM AND SODIUM CONTENT IN BLOOD SERUM [WPŁYW WYSILKU NA POZIOM WAPNIA I SODU W SUROWICY KRWI].

H. Lamers.

Wychowanie Fizyczne i Sport, vol. 10, no. 1, 1966, p. 35-41. 21 refs. In Polish.

The effect of effort on the calcium and sodium content in blood serum was examined on 88 rats in three experimental groups. A statistically significant drop in the calcium and sodium content in blood serum was found in the first group of rats which performed a single effort until exhaustion. In the second group of rats, a 30-day training caused a decrease in the calcium and sodium content in blood serum, but the difference was not statistically significant. A distinct drop in the calcium and sodium content in blood serum was found in the third group of rats, first trained and then exposed to a single standard effort until exhaustion. Each experimental group of rats had a parallel control group. The determination of the calcium and sodium content was made in a flame photometer. The results obtained show that a single exhausting effort causes a more significant decrease in the calcium and sodium content in blood serum than protracted training. The investigation confirms the increased activity of the nervous system in the regulation of water and electrolyte economy, which affects in turn all mechanisms of coordination in the organism. The investigation confirms also that the efficiency of adjustment factors and compensating mechanisms depends on the degree of training.

A66-81813

EFFECT OF CERTAIN FORMS OF INTERVAL AND CONTINUOUS TRAINING ON MAXIMUM OXYGEN CONSUMPTION [WPLYW NIEKTORYCH FORM TRENINGU INTERWALOWEGO I TRENINGU CIAGLEGO NA MAKSYMALNE ZUZYCIE TLENU].

I. Malahecki.

Wychowanie Fizyczne i Sport, vol. 10, no. 1, 1966, p. 43-49. 12 refs. In Polish.

The effect of interval training of varying load and continuous training on the increase in the maximum oxygen consumption during physical effort was measured in 24 physical education students. The investigation was carried out in three groups (six persons in each group) subjected to different training: (1) continuous training for six minutes with a load of 960 kpm/min., (2) interval training for the same time with alternate efforts for 30 sec. with a load of 1920 kpm/min. and 30 sec. rest, and (3) interval training as above, but with a load of 2430 kpm/min. The fourth group which served as control did not train. A statistically significant increase in the maximum oxygen consumption during 20 training periods was found in all the training groups. The highest increase (+765 ml./min.) was recorded after interval training with the heaviest load per minute and the biggest volume of training effort. In groups subjected to continuous and interval training with the same volume of training effort and varying load the results of the increase in the maximum oxygen consumption were lower (+279 and +347 ml./min., respectively). The results in the control group were divergent and statistically insignificant. The results obtained suggest that the effect of training depends not only on the quality (method) of the training effort but also on its volume.

A66-81814

INVESTIGATION ON THE DISTRIBUTION OF PRESSURE FORCES ON THE FOOT BY THE TENSOMETRIC METHOD [BADANIA NAD ROZLOZENIEM SIL NACISKU NA STOPE METODA TENSOMETRYCZNA].

H. Szukiewicz, J. Zieliński, and W. Sienkiewicz.

Wychowanie Fizyczne i Sport, vol. 10, no. 1, 1966, p. 59-66. 18 refs. In Polish.

The distribution of pressure forces on the foot in stationary position was investigated in 47 male individuals by the tensometric method in three different positions of the heel knot in relation to the ground. The body rested on one foot and on two feet. It was found that the tensometric method: (1) facilitates an easy determination of the distribution of the pressure forces in the foot, and permits the early detection of irregularities in the loads resting on the foot. This is frequently of decisive importance for the correction of these defects. (2) It may be a starting point for the investigation of technique in some sports disciplines connected with the necessity of the maintenance of the projection of the center of gravity on certain fields of the base (weight-lifting). (3) Preliminary investigations show a distinct effect of the elevation of the heel knot on the distribution of forces acting on the selected three points of support. (4) The tensometric method is considered useful and it is recommended for orthopedic, rehabilitation, and sports examinations.

A66-81815

SIGNIFICANCE OF ELECTROMYOGRAPHIC EXAMINATION OF MUSCLES FOR STRENGTH TRAINING [ZNACZENIE ELEKTROMIOGRAFICZNEGO BADANIA MIĘSNI DLA TRENINGU SIŁOWEGO].

K. Fidelus, H. J. Stache, and D. Schille.

Wychowanie Fizyczne i Sport, vol. 10, no. 1, 1966, p. 67-81. 12 refs. In Polish.

A general outline of the possibility of employing electromyography in investigations of sport training is given. Tasks pertaining to the analysis of the correlation between the volume of muscular potentials and the strength developed by the muscles are formulated on this basis. A research method permitting the simultaneous measurement of such parameters as strength, speed, and change of the angle in the joint, as well as integrated electromyograms are described. The examination was carried out on 15 individuals on muscle flexion and extension in the knee joint. The accuracy of measurement and the difference between the real muscle strength in vivo and the external strength registered during the examination was determined. In slow movements the correlation electromyogram (EMG) is a variable function depending on the speed of the movements, and is similar to that which appears under isometric conditions. When movements are very fast the course of the function EMG differs significantly from that observed when the movements are slow. Diagrams are recorded of the course of all the correlations analyzed. The data are given as percentage values. Some practical conclusions are drawn on the basis of the results. They can be utilized in strength training of highly qualified competitive sportsmen.

A66-81816

BEHAVIOR OF THE CO-ORDINATION OF MOVEMENTS OF THE LOWER EXTREMITY UNDER THE ACTION OF FATIGUE AND LOAD [ZACHOWANIE SIĘ ZBORNOSCI RUCHÓW KONCZYNY DOLNEJ POD WPLYWEM ZMĘCZENIA I OBCIĄŻENIA].

M. Golema and E. Ziobro.

Wychowanie Fizyczne i Sport, vol. 10, no. 1, 1966, p. 93-97. 5 refs. In Polish.

The coordination of movements of the lower extremities was measured in 54 students from the Wrocław Higher School of Physical Education. The coordination was assessed according to the size of the fields of deviation, which are formed when a lower extremity follows the diagonals and the sides of a 50x50 cm. square. The coordination deteriorated visibly when the extremity in question was weighted with a 9.9-kilogram weight. This enlarged the deviation fields by 50%. Fatigue caused by the execution of 20 full squats and vertical movements of the legs in the lying position (so-called "scissors") did not change significantly the co-ordination of movements. After the calculation of correlation coefficients between measurements made before and after effort, first when the extremity was weighted and then not, it appeared that measurements made when the extremity was weighted were correlated most strongly ($r=0.643$). The conclusion is drawn that measurements made under these conditions are best for the diagnosis of coordination of movements.

A66-81817

PULSE RATE AND PULMONARY VENTILATION AS PREDICTORS OF HUMAN ENERGY COST.

B. J. Sharkey, J. F. McDonald, and Lynn G. Corbridge (Mont. U., Human Performance Lab., Missoula).

Ergonomics, vol. 9, May 1966, p. 223-227. 12 refs.

Four young men were exercised at six grades on the motor-driven treadmill to derive data for regression equations, one to predict oxygen consumption from pulse rate data and the other using the ventilation rate. Separate equations were derived for each subject. The precision of prediction was then tested in three work tasks including treadmill walking while holding a weight in a static contraction, cycling the bicycle ergometer, and hand-cranking the ergometer. Although large mean differences in percentage error were recorded in the

pulse rate prediction, they were not statistically significant, probably due to large individual variations. The differences in ventilation rate prediction were significant and indicated the need for using closely related activities when deriving the predictive equations. Prediction accomplished with the ventilatory data resulted in smaller errors than did the pulse rate predictions.

A66-81818

EFFECTS OF AN ARTIFICIAL ACCLIMATIZATION TECHNIQUE ON INFANTRY PERFORMANCE IN A HOT CLIMATE.
K. D. Duncan (Army Personnel Res. Estab., West Byfleet, Surrey, Great Britain).

Ergonomics, vol. 9, May 1966, p. 229-244. 16 refs.

The performance of an infantry company was first assessed on a three-day exercise in Great Britain. Its twelve sections were then divided into two treatment groups. The experimental group, consisting of the six odd-numbered sections, was subjected to an artificial acclimatization routine consisting of physical exercises in an improvised hot chamber. The control group, consisting of the six even-numbered sections, performed the same exercises in a room of similar proportions at ambient temperatures. After approximately two weeks of these training regimes, the company was immediately flown to Aden where its performance under considerable stress was assessed during a seven-day exercise in the desert. Of eight performance tests only three indicated beneficial effects of artificial acclimatization. The most impressive difference between the two groups was in the number of casualties, most of which occurred during marching tests. Casualty incidence was three times greater in the control group, both for heat casualties and for all casualties regardless of the disorder diagnosed. There are indications that the marching speed of the subjects who carried on may also have been improved by artificial acclimatization. Statistically significant differences in favor of the artificially acclimatized group were also observed on two other performance tests: crossing obstacles and carrying water jerrycans at the run. Questionnaire responses indicated that, by the end of the desert exercise, the individual subject's estimates of his section's effectiveness and his feelings of loyalty to it were more adversely affected in the control group.

A66-81819

COMPARISON OF THE EFFECT OF HARD AND EASY MENTAL ARITHMETIC UPON BLOCKING OF THE OCCIPITAL ALPHA RHYTHM.

Alan Glass (Birmingham U., Med. School, Dept. of Anat., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 18, May 1966, p. 142-152. 25 refs.

Mental Health Res. Fund and Caroline Harrold Res. Fund supported research.

The intensity of blocking of the alpha rhythm of the electroencephalogram (EEG) induced by the solution of five Hard mental multiplications was compared with the intensity of blocking induced by five Easy mental multiplications in 36 normal subjects. From predictions derived from the application of two hypotheses concerning the intensity of blocking, it would be anticipated, firstly, that blocking would be more intense in the Hard tasks, if their solution required increased mental concentration and, secondly, that insofar as "higher thought" processes are more extensively required in the solution of Hard tasks, then blocking would be less intense in Hard tasks than in Easy tasks. However, the findings of the experiment are that blocking is of the same intensity in tasks of

both kinds. Possible reasons for this are discussed. Hard tasks differed from Easy tasks, with regard to the relation of EEG changes and performance. It is thought that different mechanisms may underlie the solution of the two types of task.

A66-81820

FUNCTION OF CUES IN THE PERCEPTUAL LEARNING OF VISUAL SLANT: AN EXPERIMENTAL AND THEORETICAL ANALYSIS.

Robert B. Freeman, Jr. (Pa. State U., University Park).

Psychological Monographs: General and Applied, vol. 80, no. 2, 1966, 29 p. 64 refs.

Grant NIH MH-10691 and Natl. Inst. of Mental Health supported research.

Discrimination training on visual slant was administered in two experiments to human subjects. Experimentally determined pretraining error resulted from the variation in the size of the plane, rectangular stimuli. The effect of training was proportional to the magnitude and direction of pretraining error, was inversely related to the difference in size between the training and test stimuli, and generally increased the veridicality of judgment. In a third experiment, judgments of slant were influenced by instructions to attend to particular characteristics of the stimulus. The results support the hypothesis that the effectiveness of cues to slant may be altered by differential reinforcement or by instructions. A general theory of perceptual learning is described, in which the effectiveness of cues in eliciting discriminative responses (cue relevance) is related to differential reinforcement during perceptual training. The theory of cue relevance is compared with contemporary theory and experimentation in perceptual learning.

A66-81821

FATTY CHANGE OF THE GRANULAR PNEUMOCYTE IN CCl₄ INTOXICATION.

Enrique Valdivia and Jayashree Sonnad (Wis. U., Med. School, Dept. of Pathol., Madison).

(Federation of Am. Soc. for Exptl. Biol., 50th Ann. Meeting, Atlantic City, N. J., Apr. 1966).

Archives of Pathology, vol. 81, Jun. 1966, p. 514-519. 10 refs.

The present report describes severe fatty changes of the granular pneumocytes in guinea pigs after single peritoneal injections of one cc. of CCl₄/kg. of body weight. Sudan IV-stained frozen sections demonstrated few fat vacuoles in the alveolar walls at three hours, numerous fat droplets were seen at 24 and 48 hours of CCl₄ intoxication. Electron microscope observations demonstrated that the Sudanophilic vacuoles corresponded to lipid droplets in the cytoplasm of the granular pneumocytes lining the pulmonary alveoli. Some of the granular pneumocytes had marked cytoplasmic vacuolization. CCl₄ intoxication produced an increase of the lamellar bodies and thin packed whirls of lamellae, in the granular pneumocytes.

A66-81822

EFFECT OF ALTITUDE AND SEASON ON THE CANINE HEMOGRAM.

Ralph E. Thomas (U. S. Army Med. Lab., Fort Baker, Calif.) and John E. Kittrell (Ga. U., School of Vet. Med., Athens).

Journal of the American Veterinary Medicine Association, vol. 148, May 15, 1966, p. 1163-1167. 29 refs.

The effects of altitude and season on the erythrocyte (RBC) count, hemoglobin (Hb) content, and packed cell volume (PCV) were studied in the German Shepherd Dog. All three values were significantly lower in 100 dogs arriving at 6,000 ft. from

various, generally lower altitudes than they were in 40 dogs residing at 6,000 ft. for longer than six months. Relocation of 18 dogs from 6,000 to 10,000 ft. for six weeks resulted in a significant increase in RBC and PCV in two and four weeks, and a significant increase in Hb in four weeks. At six weeks, differences were not statistically significant. After spending 60 days at sea level, the dogs had significantly lower Hb and PCV. Blood samples were obtained from 30 dogs in December and January (winter) and again in May (spring). The RBC, Hb, and PCV values were significantly higher in winter.

A66-81823

THRESHOLD OF IRRITABILITY OF THE VESTIBULAR APPARATUS IN CHILDREN AND IN ADULT SUBJECTS [PRAH DRAZDIVOSTI VESTIBULARNIHO USTROJI DETI A DOSPELYCH].

A. Siroký, H. Krejčová, J. Slavické, and V. Hanusová. *Sborník lékařský*, vol. 67, Mar. 1965, p. 94-100. 24 refs. In Czech.

The authors estimated by the electronystagmographic method the irritability threshold of the vestibular apparatus in a group of 41 healthy children at the age of ten and in 38 students of medicine at the age of 20-25 years. The irritability threshold of the vestibular apparatus was significantly higher in the group of children ($18.15 \pm 2.09^\circ/\text{sec.}$) ($p < 0.001$) than in the group of medical students ($9.785 \pm 1.98^\circ/\text{sec.}$) ($p < 0.001$). Also the values of the lowest angle of acceleration for evoking the perrotatory nystagmus were significantly higher in children ($1.02 < 0.16^\circ/\text{sec.}^2$) in comparison with the group of students ($0.60 \pm 0.065^\circ/\text{sec.}^2$) ($p < 0.02$). Values of the latency periods of the perrotatory and postrotatory nystagmus did not differ in both groups.

A66-81824

FIBER OPTICS FOR CONTINUOUS IN VIVO MONITORING OF OXYGEN SATURATION.

Donald C. Harrison, Harry A. Miller, Walter L. Henry (Stanford U., School of Med., Dept. of Med., Palo Alto, Calif.), Narindar S. Kapany, Norman Silbertrust, and Roger P. Drake (Optics Technol., Inc., Palo Alto, Calif.)

American Heart Journal, vol. 71, Jun. 1966, p. 766-774. 16 refs.

Grants NIH HE 07684 and HE 09058-1.

The use of reflection oximetry when combined with fiber optics allows for accurate determination and long-term in vivo monitoring of oxygen saturation in peripheral vessels and in the heart. The oxygen saturations determined by fiber optics oximetry show excellent agreement with those obtained by routine spectrophotometry. Studies on the effects of variation in flow and hematocrit on the oxygen saturation determined by these methods are discussed.

A66-81825

HIGH-ALTITUDE PULMONARY HYPERTENSION.

Inder Singh (Armed Forces Med. Serv., New Delhi, India).

American Heart Journal, vol. 71, Jun. 1966, p. 841-843. 10 refs.

The symptoms of high-altitude pulmonary hypertension include dyspnea on effort, chest pain, accentuated second pulmonary sound, clockwise rotation, and prominent pulmonary artery on X-ray examination. About 10% of temporary residents with pulmonary hypertension develop right ventricular failure with elevated jugular venous pressure, enlarged and tender liver, ascites, edema, and cyanosis. The symptoms usually disappear after three months at sea level. Absolute indications

for return to sea level to avoid permanent disability are enumerated. In acute pulmonary hypertension of high-altitude pulmonary edema, there is occlusion of the alveolar capillaries and small branches of the pulmonary artery by sludged red cells and fibrin thrombi.

A66-81826

PICTURES VERSUS WORDS AS STIMULI AND RESPONSES IN PAIRED-ASSOCIATE LEARNING.

Allan Paivio (Western Ontario U., Canada) and A. Dan Yarmey (Waterloo Lutheran U., Canada).

Psychonomic Science, vol. 5, Jun. 25, 1966, p. 235-236. 8 refs.

Grant NRC, Canada APA-87.

Pictures and concrete nouns served as stimulus and response members of paired-associate (PA) lists, in a factorial design. PA learning was better with pictures than with nouns as stimuli, the effect being greater when nouns served as responses. No main effect was obtained on the response side, but an interaction indicated differential effects of response mode, depending on whether the stimuli were pictures or nouns. The results generally parallel those previously obtained with nouns varying in concreteness or imagery and further support the "conceptual peg" hypothesis.

A66-81827

SEPARATION THRESHOLDS FOR COLORED BARS WITH VARIED LUMINANCE CONTRAST.

Harold P. Bishop (Tufts U., Medford, Mass.)

Psychonomic Science, vol. 5, Jun. 25, 1966, p. 237-238.

Grant NIH NB 05088-02.

Separation threshold scores were obtained for colored rectangular bar targets of constant luminance presented against a white ground varied in luminance. Maximum separation scores were obtained at nominal zero luminance contrast with red and blue targets; and at greater than nominal zero luminance contrast with yellow and green targets.

A66-81828

A BINOCULAR PARALLAX THEORY OF THE GEOMETRIC ILLUSIONS.

Alan Cleary (London U., Birkbeck Coll., Great Britain).

Psychonomic Science, vol. 5, Jun. 25, 1966, p. 241-242. 6 refs.

A new theory of the geometric illusions is presented. Three perceptual processes are described, tending to reduce binocular parallax anomalies for environments containing overlaid objects. Inappropriate operation of these processes gives rise to the illusions. The effects of environmental training on the illusions are considered. Results from cross-cultural studies are cited and used to test a prediction from the theory concerning the magnitudes of cross-cultural differences for two forms of the vertical-horizontal illusion.

A66-81829

TEMPORAL RANGE OF APPARENT MOVEMENT AS A FUNCTION OF AGE AND INTELLIGENCE.

Robert H. Pollack (Inst. for Juvenile Res., Chicago, Ill.)

Psychonomic Science, vol. 5, Jun. 25, 1966, p. 243-244. 9 refs.

The temporal range of interstimulus intervals permitting the report of the apparent movement of a square was investigated as a function of chronological age and intelligence. Both the range and the succession to movement threshold were

found to decrease from age six through nine, and then to increase through age 11. Although correlation with IQ was positive and significant overall, it was higher in the older children.

A66-81830

CONTEXTUAL DETERMINATION OF APPARENT WEIGHT AS DEMONSTRATED BY THE METHOD OF CONSTANT STIMULI.

Dorothy Dinnerstein, Frank Curcio, and Jack Chinsky (Rutgers U., New Brunswick, N. J.)

Psychonomic Science, vol. 5, Jun. 25, 1966, p. 251-252. 5 refs.

Rutgers U. supported research.

The contextual determination of apparent weight is here confirmed with a constant-stimuli procedure. The subject, judging weights lifted in his right hand, makes a short set of successive comparisons between a standard (s) and a series of variable (v) weights. Simultaneously, he lifts in his left hand non-judged context-weights (cws) which provide differing backgrounds for s and v, respectively. The cws exert consistent effects on the apparent heavinesses of the judged weights, as reflected in the frequency with which every v in the series is judged lighter vs. heavier than s.

A66-81831

EFFECT OF ULTRA-VIOLET IRRADIATION ON SKIN COLLAGEN.

Eva Bottoms, Sam Shuster (Roy, Victoria Infirmary, Dept. of Dermatol., Newcastle upon Tyne, Great Britain), and C. W. Cater (Brit. Leather Mfg. Res. Assn., Milton Park, Egham, Surrey, Great Britain).

Nature, vol. 211, Jul. 2, 1966, p. 97-98. 8 refs.

MRC supported research.

Strips of mouse skin and pieces of kangaroo tail tendons were exposed to ultraviolet light at -20°C . The irradiation produced collagens with properties resembling those found in aging skin, i.e., there was increased molecular cross-linkage between the collagen fibrils and reduced capacity of the collagen to take up water.

A66-81832

COMPARISON OF FIELD METHODS FOR ESTIMATING CARBON MONOXIDE HEMOGLOBIN PERCENTAGES.

Peter A. Breyse, H. H. Bovee, and Leopold F. Gabay (Wash. U., Dept. of Prevent. Med., Environ. Health Div., Seattle).

American Industrial Hygiene Association Journal, vol. 27, May-Jun. 1966, p. 256-259. 5 refs.

Two field methods for estimating carbon monoxide-hemoglobin (COHb) percentages were utilized in a study to evaluate the hazards potential associated with carbon monoxide exposures. Both field methods, length-of-stain indicator tubes and gas chromatography, proved reasonably reliable when the results were compared with COHb percentages determined from blood specimens.

A66-81833

THE INFLAMMATORY REACTION IN ULTRAVIOLET INJURY.

G. Logan and D. L. Wilhelm (New South Wales U., School of Pathol., Sydney, Australia).

British Journal of Experimental Pathology, vol. 47, Jun. 1966, p. 286-299. 22 refs.

Erythema, increased vascular permeability and tissue leucocytosis were investigated in skin sites in guinea pigs, rats

and rabbits, locally treated by ultraviolet radiation. In each species the duration of irradiation was mainly determined by the minimal exposures required to evoke consistent permeability responses. Each species displayed a diphasic permeability response consisting of early and late phases, separated by an interval in which permeability approximated to the normal low level. Erythema varied in each species. In guinea pigs, mild neutrophil leucocytosis occurred in the first 16 hr. and was slowest to subside in tissue adjacent to epidermal sloughs. Although the late permeability response closely followed the onset of leucocytosis, the response was unaffected in animals rendered neutropenic with nitrogen mustard. In rats, leucocytosis closely succeeded the development of the late permeability response, but the neutrophil infiltration appeared to be particularly related to sites that later exhibited sloughing. In rabbits, the leucocytosis also appeared to be related to the impending onset of frank necrosis. The late permeability response became maximal in about 24 hr., whereas leucocytosis subsequently increased to reach a peak in 48 hr.

A66-81834

VASCULAR PERMEABILITY CHANGES IN INFLAMMATION: I. THE ROLE OF ENDOGENOUS PERMEABILITY FACTORS IN ULTRAVIOLET INJURY.

G. Logan and D. L. Wilhelm (New South Wales U., School of Pathol., Sydney, Australia).

British Journal of Experimental Pathology, vol. 47, Jun. 1966, p. 300-314. 32 refs.

The mediation of the early and late permeability responses induced by moderate ultraviolet radiation injury in the skin of guinea-pigs, rats, and rabbits was investigated by testing the effects of various pharmacological antagonists. The early response appears to be mediated by histamine in the guinea pig, and by 5-hydroxytryptamine (5-HT) in the rat. In the rabbit, the early response is not susceptible to antihistamine, and its mediator has not been identified. In none of the test species has the mediator of the late response been established. In the guinea-pig intravenous antihistamines strongly suppress the permeability effects of intracutaneous histamine for at least 2 hr., but repeated systemic or local doses do not decrease the late ultraviolet response. Suppression of the early response by antihistamine also does not affect the late phase of increased permeability. The late response in guinea-pigs is also unaffected by local intracutaneous doses of the trypsin inhibitors from soya bean, lima bean, potato, and ovomucoid given before ultraviolet irradiation or in lesions 3-2 H/2 hr. old. In the rat, the investigation of the late response was confined to the possible role of histamine and 5-HT. The response was unaffected by a 5-HT antagonist, but moderately suppressed by antihistamine. The late response was not investigated in the rabbit. Of all the preparations tested in guinea-pigs, none appeared to affect erythema in the irradiated sites.

A66-81835

PROTECTING THE IRRADIATED LENS.

H. D. Fenske (Dept. of Ophthalmol., Andrews AFB, Washington, D.C.) and P. J. Leinfelder (Iowa State U., Coll. of Med., Dept. of Ophthalmol., Iowa City).

American Journal of Ophthalmology, vol. 61, Jun. 1966, p. 1432-1442. 17 refs. Contract AEC AT(11-1)72.

Partial shielding of the rabbit eye lens during irradiation resulted in formation of a permanent arcuate lens opacity. However, there was apparent recovery of the lens. Modification of the irradiation by partial shielding prevented formation of a complete cataract in the rat lens. The fundamental cause

for this is unknown but recovery of the lens epithelium with the formation of normal lens fibers is suggested. In the partially shielded rat lens, progressive compression of the epithelial cells of the irradiated area was observed. Recovery of the lens resulted from normal multiplication of the unirradiated epithelial cells into the irradiated area and differentiation into normal lens fibers. It is suggested that, as the abnormal epithelial cells decrease, there are fewer pathologic lens fibers formed and fewer cataractous changes. The role of the lens epithelium in the formation of human cataract is discussed.

A66-81836**ECLIPSE BLINDNESS: REPORT OF AN EPIDEMIC IN THE MILITARY POPULATION OF HAWAII.**

Robert Penner and Joel N. McNair (Walter Reed Army Med. Center, Walter Reed Gen Hosp., Ophthalmol. Serv., Washington, D. C.)

American Journal of Ophthalmology, vol. 61, Jun. 1966, p. 1452-1457. 8 refs.

An analysis of the ocular effects of the partial solar eclipse of Feb. 4, 1962, on Hawaii military personnel and their dependents is presented. The retinal changes of solar retinitis were classified into three ophthalmoscopically separate stages. Comparison of initial vision and visual acuity six months post-eclipse revealed that the visual prognosis was almost always better than 20/50. In the involved eyes followed for six months, whether or not protection was claimed to have been used and whether or not systemic steroids were administered, the chance of recovery of 20/20 visual acuity was approximately 50%. Prior existing muscle imbalance or amblyopia resulted in the solar retinitic lesion being generated in the dominant eye. The absence of retinal burns in severely ametropic eyes was noted. No increased incidence of solar burns was detected in deeply pigmented eyes or heavily pigmented individuals. Various forms of ineffective protective measures were cataloged.

A66-81837**PERIPHERAL VISUAL THRESHOLDS AND AREA SUMMATION.**

Valter Elenius and Terttu Karo (Turku U., Dept. of Ophthalmol., Finland).

American Journal of Ophthalmology, vol. 61, Jun. 1966, p. 1509-1513. 7 refs.

Sigrid Juselius Stiftelse supported research.

A Goldmann perimeter (provided with extra neutral filters) and the method of kinetic perimetry were used for measurements of peripheral visual thresholds and area summation in the eyes of three night-blind subjects and in normal controls. Data are presented to show measurements made by using the standard background luminance (3.15 m.L.) of the Goldmann perimeter, as well as a reduced background luminance (0.032 m.L.). In a case of stationary congenital night blindness, the photopic thresholds were within normal limits, whereas in mesopic conditions the thresholds were clearly higher than normal. In two siblings with slowly progressing tapetoretinal degeneration, both the photopic and mesopic thresholds were clearly higher than normal.

A66-81838**HEALTH HAZARDS ASSOCIATED WITH WORK IN CONFINED SPACES.**

Morris Kleinfeld and Benjamin Feiner (N. Y. State Dept. of Labor, Div. of Ind. Hyg., New York).

Journal of Occupational Medicine, vol. 8, Jul. 1966, p. 358-364. 5 refs.

In 21 accidents during work in confined spaces, a total of 46 workers was affected. Negligence was the primary cause of death or injury. In each situation virtually no safety precautions were followed and no trained personnel were available to administer first aid immediately after the accidents occurred. Safeguards for work in confined spaces are outlined under three broad categories: (1) testing and preparation of the confined space before entry; (2) use of the precautionary measures during occupancy; and (3) assurance of the availability of prompt rescue and adequate first aid should an accident occur. In general, these safeguards can be enforced readily in large plants where they may be incorporated into existing safety programs, if they are not already part of them. However, application of these safeguards in small factories is not easy. Such establishments, in which most of the reported accidents occurred, do not usually have adequate safety programs or supervisory personnel with clearly defined safety responsibilities. The conspicuous absence of safeguards in small establishments is due primarily to ignorance of the potential hazards inherent in work in confined spaces. The cases discussed demonstrate the need for a vigorous educational effort, particularly in small plants, to minimize deaths and injuries due to work in confined spaces.

A66-81839**HEARING LOSS FROM NOISE.**

Jon L. Konzen (Mich. U., Inst. of Ind. Health, Ann Arbor).

Journal of Occupational Medicine, vol. 8, Jul. 1966, p. 387-389.

One case history of noise-induced hearing loss is presented. The subject sustained a marked hearing loss without awareness of high noise exposure. His noise-induced hearing loss did not progress while he was working in a noise-hazardous area because there was an adequate hearing conservation program. It is suggested that his stress and anxiety, with personality trait disturbance, were strong contributing factors in the symptom complex.

A66-81840**MNEMONIC ORGANIZATION AS A DETERMINANT OF ERROR-GRADIENTS IN VISUAL PATTERN PERCEPTION.**

E. Rae Harcum (William and Mary, Coll., Williamsburg, Va.)

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 671-696. Grant PHS HD 00207-06.

This paper presents evidence that the accuracy of tachistoscopic perception for elements arranged in a spatial pattern is determined primarily by the difficulty of organizing the pattern for storage in memory, rather than by the sensory capacity of the visual system for discriminating the individual elements. Four lines of evidence are followed. The first shows that the distribution of errors among the elements of a serial-learning task and the pattern-perception task are affected similarly by manipulation of the same given variable. The second reveals parallels between the element-position functions of errors in serial learning and in pattern perception for different independent sets of data. The third line of evidence shows that errors in tachistoscopic perception are independent of the retinal area stimulated by individual elements. The final area of evidence is the demonstration of a close similarity for the serial learning and the perceptual tasks of the functions relating errors per element and ranks of the elements in accuracy of performance for individuals.

A66-81841**ATTENTIONAL RESPONSE OF HUMANS AND SQUIRREL MONKEYS TO VISUAL PATTERNS VARYING IN THREE PHYSICAL DIMENSIONS.**

Larry T. Brown and Clifford R. O'Donnell (Okla. State U., Stillwater).

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 707-717. 20 refs.

Grant PHS MH-10350-01.

Two experiments were performed to investigate the importance to "attention" of three physical parameters of visual patterns: number of components, angular variance of components (AV), and number of turns characterizing the components (NT). In Exp. I 30 human subjects were employed and time spent viewing each of a set of nonsense patterns was used as the measure of attention. Patterns containing 18 components elicited longer viewing times than those containing three components ($P < .001$), and patterns containing components of high AV were viewed longer than those with components of low AV ($P = .052$). In Exp. II eight squirrel monkeys served as subjects and a measure of attention based on performance in a discrimination-learning situation was employed. Again, patterns containing the larger number of components had a greater effect on behavior than patterns with fewer components ($P < .05$); however, no effect on performance of AV or NT was observed. It was concluded that the number of elements present in visual patterns constitutes a variable of substantial importance to the attention of both the human and the squirrel monkey.

A66-81842

PERSONALITY VARIABLES IN AUTOKINETIC FIGURE WRITING.

Henry G. Cornwell (Lincoln U., Jefferson City, Mo.)

(*Eastern Psychol. Assn., Ann. Meeting, Atlantic City, N. J., Apr. 24, 1965*).

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 731-735. 5 refs.

Mary Reynolds Babcock Found. supported research.

Fifty subjects in darkness perceived a fixed point of light as tracing letters, numerals, and geometric shapes according to verbal suggestions. Measures of movement and figure latency, letter, numeral, and shape frequency showed small correlations ($p = .05$) with six factors in the Cattell 16 Personality Factor Questionnaire: Ego Strength, Dominance, Superego Strength, Alaxia, Timidity, and Ergic Tension.

A66-81843

RETENTION OF VERBAL MATERIALS PERCEIVED IMMEDIATELY PRIOR TO ONSET OF NON-REM SLEEP.

Gregory Portnoff, Frederick Baekeland, Donald R. Goodenough, Ismet Karacan, and Arthur Shapiro (N. Y. State U., New York).

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 751-758. 16 refs.

Grants NIH MH-03885, MH-05518, MH-K3-16.619, and 5-K3-MH-23.901.

During the night subjects were awakened a number of times and shown verbal learning materials. Latency of subsequent onset of non-rapid eye movement (non-REM) state sleep was experimentally manipulated. In the morning, retention for the materials perceived was tested. Retention for words perceived immediately prior to sleep onset was significantly worse than for those followed by a period of enforced wakefulness. This finding suggests that non-REM sleep may impede the consolidation of memory traces.

A66-81844

MOTOR SKILLS BIBLIOGRAPHY: XLVIII. PSYCHOLOGICAL ABSTRACTS, 1965, VOLUME 39, THIRD THIRD.

R. B. Ammons and C. H. Ammons.

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 819-822. 104 refs.

This is an alphabetical listing of 104 references to work on simple and complex motor skills of children and adults.

A66-81845

STIMULUS EQUIVALENCE OF AUDITORY AND VISUAL PATTERNS IN AN INTERMODAL DISCRIMINATION TASK.

D. R. Brown, C. F. Condon (Purdue U., Lafayette, Ind.), and Lloyd Hitchcock, Jr. (Naval Air Develop. Center, Johnsville, Pa.)

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 823-832. 16 refs.

Contract NADC N62269-2670 and Grant PHS HD-00909-04.

One hundred college students were tested on cross-modal discrimination problems in an effort to determine possible bases for translating patterned stimuli between the visual and auditory modalities. The 160 four-choice oddity problems were presented as auditory patterns with the solution requiring a response to visual equivalents. Of the five pattern characteristics related to discrimination, it was found that the presence of all pattern characteristics facilitated intermodal discrimination with the exception of a baseline for pitch (visual height). In addition, increasing pattern complexity facilitated performance. The data are interpreted as supporting central factors in pattern perception.

A66-81846

ANALYSIS OF PERSPECTIVE REVERSAL AND ASSOCIATED APPARENT MOTIONS USING A PERSPECTIVE-BOUND MOVEMENT ILLUSION.

Roy B. Mefferd, Jr., Betty A. Wieland, Thomas H. Cook, Timothy G. Sadler, Richard G. Benton, and Gordon M. Redding (VA Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Tex.)

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 835-858. 18 refs.

The nature of perspective reversal was examined using among other techniques a previously undescribed movement illusion specific to the non-veridical perception of actual depth. The apparent movement of the illusion proved to be veridical parallax movement displaced spatially. Apparent changes in direction of rotation and apparent oscillation were shown to be consequences of perspective. Detailed analysis revealed that depth perception *per se* is veridical, and only the apparent relocations of parts are involved in perspective reversal. When a perspective reverses, the subject misperceives the location of the near and far parts of the object, but those parts "reverse" about the veridical center *in situ* and on a strictly 1 : 1 depth basis. Perspective changes occur only at a plane perpendicular to the subject in the depth dimension, never in the horizontal-vertical plane. Parts of a single figure may reverse independently of others, thereby forming a separate perceptual unit, the configuration of which is determined by the subject's position rather than by properties of the stimulus. The analysis of the nature of perspective reversal suggests that depth perception is composed of at least two processes: the perception of absolute depth, and the spatial ordering of objects or points on objects. The first process seems not to be related to perspective reversal, but the second seems to be implicated as the critical one.

A66-81847

PERCEPTION BIBLIOGRAPHY: XXIX. PSYCHOLOGICAL INDEX NO. 25, 1918.

A66-81848

C. H. Ammons and R. B. Ammons.

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 896-898. 74 refs.

A bibliography is given containing 74 items relevant to perceptual problems. Papers refer mainly to problems of vision, and visual illusions.

A66-81848**PERCEPTION BIBLIOGRAPHY: XXX. PSYCHOLOGICAL INDEX, NO. 26, 1919.**

R. B. Ammons and C. H. Ammons.

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 907-909. 70 refs.

A bibliography is presented containing 70 items dealing with some aspect of perception listed for the year 1919. Eight of the papers deal directly with problems of aviators and flying.

A66-81849**AUDITORY AWAKENING THRESHOLDS IN REM AND NREM SLEEP STAGES.**

Allan Rechtschaffen, Peter Hauri, and Maurice Zeitlin (Chicago U., Ill.)

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 927-942. 31 refs.

Grants NIMH M-4151 and MH-K3-18,428.

The auditory awakening thresholds of the major electroencephalographically defined sleep stages were compared. A modification of the method of constant stimuli was used in an apparently successful attempt to minimize the incorporation of the experimental stimuli into the mental activity of the sleeper. A total of 319 experimental trials were distributed among seven humans who served for about six experimental nights each. The sequence and timing of experimental trials were counterbalanced to control for nights, habituation, amount of accumulated sleep, and amount of sleep since last awakening. The results showed approximately equal awakening thresholds during rapid eye movement periods (REM) and stage two (low voltage EEG and 12 to 14 c.p.s. "sleep spindles"). Both these stages had lower awakening thresholds than delta sleep (large slow EEG waves). Awakening thresholds became lower with accumulated sleep, independent of sleep stage. There were no significant stage-independent relationships between awakening threshold and time since last awakening or time since last body movement, although the latter were varied over a relatively narrow range which limits the generality of these findings. There was no stage-independent relationship between heart rate and awakening threshold. The possible physiological determinants of the awakening response are discussed.

A66-81850**PERCEPTION OF SHAPE AS A FUNCTION OF ORDER OF ANGLES OF SLANT.**

A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).

Perceptual and Motor Skills, vol. 22, Jun. 1966, p. 971-978. 12 refs.

Twenty-four subjects viewed a rectangle and a triangle binocularly under induced viewing conditions. The forms were shown in the frontal-parallel plane and at slants of 15°, 30°, 45°, and 60° in random, increasing and decreasing order of angles. Subjects judged shape by matching and by drawing. There was more constancy for decreasing order than for increasing order. The results for random order were inconclusive. The differences between the indices for drawing and

matching were, in general, not significant. The rectangle produced more constancy than the triangle, especially at large slants. The series effect was contrary to prediction based on Helmholtzian and Gestaltist interpretations of the relation between phenomenal slant and phenomenal shape and was interpreted as consistent with adaptation-level theory on the assumption that the focal stimuli affected responses more than the residual stimuli.

A66-81851**EFFECTS OF ULTRA-VIOLET ALONE AND SIMULATED SOLAR ULTRA-VIOLET RADIATION ON THE LEAVES OF HIGHER PLANTS.**

Morris G. Cline (Calif. Inst. of Technol., Div. of Biol., Pasadena) and Frank B. Salisbury (Utah State U., Plant Sci. Dept., Logan).

Nature, vol. 211, Jul. 30, 1966, p. 484-486. 12 refs.

NASA supported research.

Leaf-survival experiments involving 67 species with special emphasis on *Xanthium pennsylvanicum*, *Zea mays*, and *Pinus nigra* were conducted after ultra-violet light alone and after high-intensity simulated solar spectrum. In the first experiment, there was a wide variation in the resistance of the species tested. In the second experiment, the total radiation levels were equivalent to those above the atmosphere of Mars, Earth, and Venus (0.86, 2.00, and 3.82 cal./cm.²/min., respectively). *Xanthium* leaves were killed after 1.8 hr. of Venusian-level radiation but leaf-kill by Martian-level radiation required 4.5 hr. Destruction of exposed leaf blades of week-old *Zea* plants required 8 hr. of Venusian-level radiation and 32 hr. of Martian-level radiation. *Pinus* seedlings showed no serious damage until nearly 100 hr. of Venusian-level radiation and 400 hr. (30 days) of terrestrial-level radiation.

A66-81852**D_L AND THE DIMENSIONS AND FUNCTIONAL CAPACITIES OF THE O₂ TRANSPORT SYSTEM IN HUMANS.**

Alf Holmgren and Per-Olof Åstrand (Kungliga Gymnastiska Centralinst., Infectious Disease Hosp. and Dept. of Physiol., Clin. Physiol. Lab., Stockholm, Sweden).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1463-1470. 16 refs.

Swed. Natl. Assn. against Heart and Chest Diseases and Svenska Idrottens Vetenskapliga Forskningsrad supported research.

Pulmonary diffusing capacity was measured during exercise, with steady-state technique in 10 healthy young men and women and related to a number of measures of body size, static dimensions, and functional capacities of the lungs and of the cardiovascular system. The static dimensions of the lungs were determined as total lung capacity and its subdivisions. The functional capacity of the lungs was measured as the maximal voluntary ventilation and ventilation during determination of maximal oxygen uptake. The static dimensions of the cardiovascular system were determined by the total hemoglobin, blood volume, stroke volume of the heart, and hemoglobin concentration. The functional capacity of the cardiovascular system was measured as the maximal cardiac output and maximal heart rate. D_{LCO} was significantly correlated to all these variables. The highest correlation coefficient was to total hemoglobin. Elimination of the influence of hemoglobin concentration eliminated the difference between sexes. The results demonstrate that a high diffusing capacity is accompanied by a high aerobic capacity, large lungs with a large ventilatory capacity, and a large cardiovascular system with a large maximal cardiac output.

A66-81853**CHANGES IN LUNG VOLUME, DIFFUSING CAPACITY, AND BLOOD GASES IN MEN BREATHING OXYGEN.**

P. R. B. Caldwell, W. L. Lee, Jr., H. S. Schildkraut, and E. R. Archibald (6570th Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).

Journal of Applied Physiology, vol. 21, Sep. 1965, p. 1477-1483. 24 refs.

Four volunteers were placed in a controlled environmental chamber and breathed 98% oxygen at 760 mm. Hg pressure for 30, 48, 60, and 74 hr., respectively. There was a fall in vital capacity which was rapidly progressive after 60 hr. of exposure and three subjects exposed longer than 30 hr. had drops in pulmonary diffusing capacity. The alveolar-arterial oxygen difference ranged from 59 to 121 mm. Hg with an average of 89 mm. Hg. Chest X-rays revealed no abnormal shadows in the lung fields and physical examination showed no apparent abnormalities. Interpreted in the light of observations in animals exposed to the same conditions, these changes are explained on the basis of alveolar edema formation and an alteration in the air-blood barrier. A fifth volunteer who breathed air in the same chamber for six days showed no changes in lung volumes, diffusing capacity or blood gases.

A66-81854**PLEURAL PRESSURES AT DORSAL AND VENTRAL SITES IN SUPINE AND PRONE BODY POSITIONS.**

Wilhelm J. Rutishauser, Natalio Banchemo, Anastasios G. Tsakiris, Alphonse C. Edmundowicz, and Earl H. Wood (Mayo Clin. and Mayo Found., Sect. of Physiol. and Minn. U., Mayo Graduate School of Med., Rochester).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1500-1510. 39 refs.

NASA Grant NsG-327, Grants AF 33(659)-8899, NIH H-3532, and AHA C110.

Intrapleural pressures at two to five different sites in the right pleural space of nine anesthetized dogs were measured with fluid-filled catheters while the dogs were supported in the supine and prone positions by means of a half-body cast. Tips of the intrapleural catheters were placed at heart level in the cephalocaudal direction at ventral (retrosternal) and dorsal (paravertebral) sites. In the supine position mean end-expiratory pressure gave an average gradient of 0.64 cm. H₂O per cm. vertical distance between the two recording sites. In the prone position the average gradient was 0.91 cm. H₂O per cm. vertical distance. Esophageal pressures were more positive than pleural pressures at the same vertical height in the thorax by about 2-5 cm. H₂O. During the increase in weight induced by acceleration, pleural pressure differences were increased roughly in proportion to the g level. The resulting intrathoracic pressure imbalances would be expected to be a potentially serious hazard during the launch and reentry phases of space flights.

A66-81855**STRATIFICATION OF VENTILATION AND BLOOD FLOW IN THE NORMAL LUNG.**

John Read (Sydney U., Dept. of Med., Australia).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1521-1531. 10 refs.

Natl. Heart Found., Australia, Joint Coal Board, New South Wales, Sydney U., and Australian Res. Grants Comm. supported research.

The rate of change of gas tensions during breath holding was examined at three fixed points on expired gas tension

plateaus following single inspirations of an argon-oxygen-nitrogen mixture. At each plateau point P_A rose and P_{O_2} fell linearly with time and P_{CO_2} followed an exponential course towards mixed venous P_{CO_2} . Rates of gas tension change were different at each plateau point. Expired gas tension plateaus corrected to zero time, following different inspired test-breath volumes, were consistent with a lung model in which two alveolar populations were arranged in series with upstream-downstream volume and ventilation ratios in the range 1 : 1 to 3 : 1. Previously reported multibreath and "argon bolus" studies of gas distribution in the normal lung were also shown to be consistent with this series model. Studies of expired gas plateaus when the preceding test breath also contained nitrous oxide allowed gas exchange phenomena to be separated from diffusive mixing effects. A gradient of diminishing Q_C/V_A accompanied the effective gradient of diminishing V_A/V_A down through the alveolar populations arranged in series, but P_{O_2} and P_{CO_2} gradients due to residual effective V_A/Q_C disparities persisted.

A66-81856**EFFECTS OF THE VALSALVA MANEUVER ON BLOOD FLOW IN THE THORACIC AORTA IN MAN.**

Irwin J. Fox, William P. Crowley, Jr., Joseph B. Grace, and Earl H. Wood (Mayo Clin. and Mayo Found., Sect. of Physiol., Rochester, Minn.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1553-1560. 22 refs.

Grants NIH HE-03532 and HE-08873.

Moment-to-moment changes in blood flow down the thoracic aorta, a flow representing a major fraction of the cardiac output, were measured by the constant-rate-injection indicator-dilution technic before, during, and after 15-sec. periods of voluntary increases in airway pressure to 40 mm. Hg (Valsalva maneuver). In 12 experiments in eight healthy men, thoracic aortic flow decreased to a mean value of 35% of the control flow during the period of forced expiration (stage II) and then increased to a value 19% above the control level during the overshoot (stage IV). A postulated increase in flow during the initial phase of the maneuver (stage I) was not demonstrated. The time course of changes in thoracic aortic flow during the Valsalva maneuver calculated from the dilution curves was similar in contour to the changes in total cardiac output estimated from simultaneously recorded central arterial pressure pulses. The changes in systemic and pulmonary artery pressures resembled those reported previously during this maneuver.

A66-81857**ASSESSMENT OF CARDIAC FUNCTION USING RESATURATION CURVES.**

Malcolm B. McIlroy, Donald W. Crawford, Donald B. Jennings, and Arnold Naimark (Calif. U., San Francisco Med. Center, Dept. of Med. and Cardiovascular Res. Inst.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1561-1567. 31 refs.

Grants PHS HE-06285 and HE-5251.

A reproducible, objective measure of lung-to-ear circulation time was made during exercise. Alveolar P_{O_2} is lowered to about 50 mm. Hg and abruptly raised to about 350 mm. Hg by having the subject take a breath of nitrogen followed by a breath of oxygen. Changes in arterial oxygen saturation are recorded with an ear oximeter. The rise in arterial saturation after the breath of oxygen is exponential during exercise and its time constant (γ) is measured. $1/\gamma$ represents the ratio Q/V where Q is the pulmonary blood flow and V is related to

the volume of the dominant mixing chamber in the left heart. Values for Q/V are arbitrarily expressed in liters/min. per 300 ml. left heart mixing volume. Exercise tests in 28 normal subjects and 38 patients with rheumatic heart disease indicate that Q/V increases with exercise. The increase in Q/V in patients with heart disease is less than normal. The method is not applicable in patients with gross abnormalities of distribution of ventilation.

A66-81858

THERMAL REGULATION DURING WATER IMMERSION.
Albert B. Craig, Jr. and Maria Dvorak (Rochester U., School of Med. and Dentistry, Dept. of Physiol., N. Y.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1577-1585. 20 refs.

PHS, AHA, and Life Insurance Med. Res. Fund supported research.

Ten subjects were studied during head-out immersion in nine different water temperatures ranging from 24°C. to 37°C. The period of immersion at each temperature was one hr., during which time various body temperatures, pulse rate, blood pressure, and oxygen consumption were observed. In water temperatures less than 35.6°C. there was a reduction in central body temperature despite the fact that vasomotor controls of heat loss were evident. Increased heat production was noted if the water temperature was 30°C. or less. Water temperatures of 36°C. or more imposed a heat stress on the subject causing an increase in the pulse rate and pulse pressure. It is suggested that there is a very narrow range of water temperature (35.0-35.5°C.) which can be considered as "neutral".

A66-81859

A TEST OF THE EFFECTIVENESS OF ACCLIMATIZATION PROCEDURES IN THE GOLD MINING INDUSTRY.

C. H. Wyndham, N. B. Strydom, J. F. Morrison, G. A. G. Bredell, C. H. Van Graan, L. Holdsworth, A. Van Rensburg, A. Munro, and A. Levin (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab. and Phys. Sci. Lab., Johannesburg, South Africa).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1586-1588. 6 refs.

A standard heat stress test was used to compare the effectiveness of acclimatization procedures. The test comprises a 4-hr. exposure at 90°F. (with the air almost saturated with water vapor) at an air velocity of 80 ft./min. During this period the men work at an oxygen consumption of 1 liter/min. (5 cal./min.). A statistical technique, based upon the standard deviations of rectal temperature, heart rate, and sweat rate, is presented for judging whether the results from the men under test are significantly different from either highly acclimatized or unacclimatized groups of men. The test has been applied in an assessment of the standards of acclimatization achieved in a number of centers where laborers are acclimatized for service in the gold mining industry, and the results indicate its effectiveness for this purpose.

A66-81860

HEMODYNAMIC RESPONSE TO WORK AT SIMULATED ALTITUDE, 4000 M.

Jesper Stenberg, Björn Ekblom, and Roger Messin (Kungliga Gymnastiska Centralinst., Dept. of Physiol., Stockholm, Sweden).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1589-1594. 20 refs.

Swed. Natl. Assn. against Heart and Chest Disease, Swed. Sports Federation, and Swed. Med. Res. Council supported research.

Oxygen uptake, pulmonary ventilation, cardiac output (dye-dilution technique), blood pressure (intra-arterial), oxygen content of arterial blood, and blood lactic acid concentration were determined in six men, 19-36 years of age, during submaximal and maximal work on a bicycle ergometer at sea level and after 10-60 min. exposure to P_B 462 mm. Hg in an altitude chamber (simulated altitude 4,000 m., 13,115 ft.). With the arterial oxygen saturation reduced from 96 to 70%, maximal oxygen uptake was reduced to 72% of that at sea level, i.e., 3.46 and 2.50 liters/min., respectively. Maximal values for pulmonary ventilation were 118 and 124 liters/min., cardiac output 23.2 and 23.7 liters/min., heart rate 184 and 186 beats/min., stroke volume 126 and 127 ml., (A-V) O_2 diff. 108 and 146 ml. at simulated altitude and at sea level, respectively. Integrated mean arterial blood pressure was lower during work in hypoxia. At submaximal work the heart rate, cardiac output, and pulmonary ventilation were significantly elevated during hypoxia. Moderate acute hypoxia does not seem to interfere with cardiac performance or the tissues' capability to extract oxygen from the blood during exercise.

A66-81861

CARDIOVASCULAR AND METABOLIC RESPONSES OF DOGS TO EXERCISE AT HIGH ALTITUDE.

James A. Vogel and John P. Hannon (Fitzsimons Gen. Hosp., U. S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1595-1601. 31 refs.

Four chronically catheterized dogs were studied initially at 5,000 ft. during a 26-day exposure to 11,400 ft. and again upon return to the initial altitude. Cardiac output (Q) was significantly elevated both at rest (28%) and during exercise (49%) on the first day at high altitude and generally remained elevated during the entire sojourn. Heart rate was unchanged while stroke volume increased proportionately to Q. Peripheral resistance fell significantly on day one at 11,400 ft. but not thereafter. After the initial narrowing of the arteriovenous difference no further changes in oxygen tension occurred with time at high altitude. Arterial carbon dioxide tension and mixed venous carbon dioxide tension exhibited early declines followed by partial recovery during the exposure period, while pH showed no definite trend. No pronounced changes were observed in either blood glucose or lactate with change in altitude in contrast to blood nonesterified fatty acid (NEFA) level which was significantly elevated at 11,400 ft. both during rest and exercise. These data suggest that an enhanced Q is an early and adequate response to moderate, chronic hypoxemia. No harmful effects of high altitude were noted on the heart or circulation. An increased norepinephrine release indicated by elevated NEFA may account for these cardiovascular responses.

A66-81862

ELECTROMYOGRAPHY OF STATIC AND DYNAMIC POSITURES OF THE BODY SUPPORTED ON THE ARMS.

Eliezer Kamon (Coll. of Technol., Dept. of Ergonomics and Cybernetics, Loughborough, Leicestershire, Great Britain).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1611-1618. 9 refs.

Brit. Council supported research.

Surface electrodes were used to record electrical activity of muscles of three gymnasts during an exercise sequence on a pommel horse. The body was supported on the arms in a static position followed by a sideways swing. The muscles studied were: trapezius, serratus anterior, latissimus dorsi, teres major, infraspinatus, pectoralis major, deltoideus, biceps brachii, triceps brachii, flexor carpi radialis, extensor carpi radialis brevis, rectus abdominis, obliquus externus abdominis, and erector spinae. The rhythmical interplay of the right and left group muscles and the marked sudden bursts of activity of specific duration and sequence indicated the co-ordination and skill required to accomplish the movements. The electromyogram was reproducible in each individual and between subjects. The change in the intensity of electrical activity enabled comparison of muscle action to maintain static positions, to activate movements, and to control accelerated swings. The most active muscles were the anterior deltoid and the depressors, i.e., triceps brachii, pectoralis major, latissimus dorsi, and trapezius. The muscle activity for trunk movement over the fixed arms is discussed in relation to traditional anatomical terminology.

A66-81863

MEASUREMENTS OF VARIABLE VENTRICULAR OUTPUT BY THERMODILUTION: MODEL EXPERIMENTS.

Gerd J. A. Cropp (Colo. U., Med. Center, Dept. of Pediat., Cardiopulmonary Res. Lab., Denver).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1624-1632. 9 refs.

Grant PHS HE 09429-01.

Continuous and cumulative measurements of the variable pulsatile output of a pump model have been possible by infusing thermal indicator continuously into the "ventricular" chamber of the pump and recording the ratio $(\Delta T_i / \Delta T)$ of the temperature difference between the preinfusion stream and the injectate (ΔT_i) and the temperature difference between inflow and outflow tracts of the pump (ΔT) , as measured by a differential thermometer. Comparison of outputs derived by the thermal-dilution method and by an electromagnetic flowmeter showed excellent correlation when pulsatile flow was of constant stroke volume and rate or when it changed during the period of measurement. Conventional methods (using mean values of ΔT_i and ΔT and assuming constancy of ventricular output) underestimated cumulative flow whenever there were gradual, periodic, or rapid changes in pump output; the underestimates were largest when the deviations in flow from their mean values were greatest. The proposed variable flow thermal-dilution technique should lend itself without significant modification to continuous measurements of cardiac output.

A66-81864

TELEMETRY OF BLOOD PRESSURE IN FREE-RANGING ANIMALS VIA AN INTRAVASCULAR GAUGE.

Robert L. Van Citters and Dean L. Franklin (Wash. U., Reg. Primate Res. Center and Dept. of Physiol. and Biophys., Seattle and Scripps Clin. and Res. Found., La Jolla, Calif.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1633-1636. 6 refs.

Grants PHS FR-00166, HE-08433, and HE-08337 and Wash. State Heart Assn. supported research.

A small biological pressure transducer was developed for chronic implantation into the lumen of major vessels or cardiac chambers in experimental animals. Gauges have functioned continuously for over a year when implanted into the aorta or left ventricle of dogs and baboons. The device has been used for telemetry of blood pressure from free-ranging

baboons and giraffes in their habitat in East Africa, and to study blood pressure responses of laboratory dogs and baboons during exercise.

A66-81865

MEASUREMENT OF BLOOD FLOW BY EXTERNAL MONITORING OF RADIOISOTOPES.

James E. Worsham, Jr. (Va. Med. Coll., Richmond).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1653-1654.

NASA and NIH supported research.

Equations for measuring average blood flow per unit volume as developed by K. L. Zierler (1965) are modified to permit the measurement of the volume of distribution of a radioactive indicator. One experiment suggested by Zierler is shown to be incorrect.

A66-81866

MEASUREMENT OF MUSCULAR POWER (ANAEROBIC) IN MAN.

Rodolfo Margaria, Piero Aghemo, and Emilio Rovelli (Milan U., Ist. di Fisiol. Umana, Italy).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1661-1664.

A test for the maximum anaerobic power, or the maximal work performance, in a short burst of maximal activity in man has been devised. It consists of measuring with an electronic clock the vertical component of the maximum speed with the subject running up an ordinary staircase. Mechanical energy is given in kg.-m./kg. sec. and it amounts to 1.6 for young fit subjects of 20-30 years of age; it decreases with age to about 0.8 at 70 years. The efficiency of this exercise is about 0.25 and therefore the energy requirement amounts to about 50 kcal./kg. hr. The test does not require a particular skill either from the operator or from the subject, the time required is very short, the only apparatus needed is a watch sensitive to 0.01 sec., and the data obtained are very reproducible.

A66-81867

A MODIFIED OXYGEN GAUGE FOR THE RAPID MEASUREMENT OF P_{O_2} IN RESPIRATORY GASES.

Stanley E. Elliott, Franz J. Segger, and John J. Osborn (Presbyterian Med. Center, Inst. of Med. Sci., San Francisco, Calif.)

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1672-1674.

PHS and San Francisco Heart Assn. supported research.

A modified, commercially available gas-phase oxygen sensor is described which has a response time of .05 sec. (10-90%) making it fast enough for single-breath analysis of respiration. It is based on a small tubular solid electrochemical cell, held at a high temperature, which generates an electromotive force proportional to the logarithm of the ratio of the partial pressure of oxygen in gas pulled through it, to room air. It is stable, reliable, and suitable for long-term studies.

A66-81868

A SELF-BALANCING SCALE FOR WEIGHING HUMAN SUBJECTS.

Arthur C. Custance (Biol. and Radiation Labs., Defence Chem., Ottawa, Canada).

Journal of Applied Physiology, vol. 21, Sep. 1966, p. 1675-1676.

A method for the elimination of judgment in determining human sweating weight losses is described. A mercury

A66-81869

switch, mounted on a scale beam, is used to adjust the content of a counterweight in the form of a water reservoir through a solenoid valve. The difference in volume of water in the before and after exercise situations is a measure of the subject's water loss.

A66-81869

A SIMPLE NOMOGRAM FOR CALCULATION OF ALVEOLAR GAS TENSIONS AND THE V_D/V_T RATIO.

David Y. Rosenzweig and John Immekus (Marquette U., School of Med., Dept. of Med. and Milwaukee County Gen. Hosp., Wis.) *Journal of Applied Physiology*, vol. 21, Sep. 1966, p. 1677-1678.

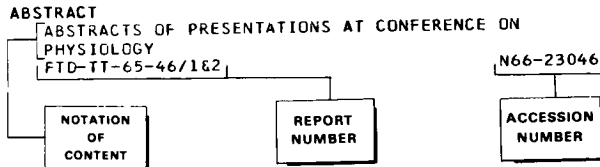
A graphic representation of the alveolar air relationship which is based on a construction of similar triangles is presented. It is generally applicable for calculations of alveolar gas tensions of any gas at any particular inspiratory concentration.

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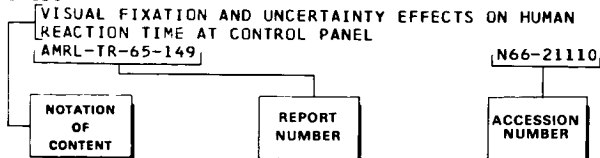
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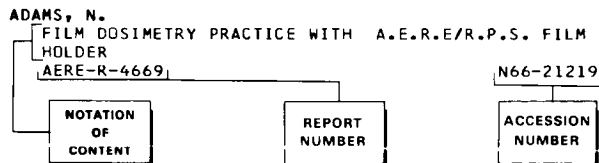
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